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Agriculture.

THE CONTROL OF IRISH BLIGHT IN POTATOES.

Quite recently, in the course of an interview with the Director of Agriculture (Mr. A. H. Benson) (says the "Agricultural Gazette" of Tasmania), Mr. E. C. Pratt, an English potato-grower, stated:—"I am of opinion that the Irish blight in Tasmania can be greatly reduced, if not destroyed. To commence with. the profitable lifetime of any variety of potato is from fifteen to twenty years; and when any one variety is grown beyond that number of years, it loses its constitution, and, consequently, is more liable to disease than a new variety of stronger growth. My firm belief is that the present varieties grown in Tasmania, commercially, should be discarded, and new and disease-resisting varieties should be imported from England or Scotland, the latter being the rearing-bed of the potato world. I am sure this new seed would produce heavy crops free from blight."

On the question of spraying, Mr. Pratt was very emphatic. He said:—

"I would also recommend that spraying be carried out; the more times the better, as each spraying will increase the yield of the crop considerably, and, at the same time, prevent disease.

"Potatoes should not be grown on the same ground oftener than one year in three. Artificial manures have been proved the best for the tuber, provided they contain a fair percentage of ammonia. . . . Ploughing in green crops, such as peas, oats, and mustard, will get the land in good heart and supply humus as well as furnish a considerable amount of organic nitrogen.

"Potatoes should always be lifted when mature, and not allowed to remain in the land to harbour disease. . . . All precautions should be taken to prevent disease, but the two most important items are:—

1. To get entirely new stocks from England or Scotland.
2. Continuous spraying, which will prevent any disease making headway, and, at the same time, put money into the pocket of the grower, as every spraying increases the yield."

Mr. Pratt gained his experience in South Lincolnshire, England, the largest potato-growing district in Great Britain, where on their own farms they grow upwards of 300 acres of potatoes yearly. At one period, they had "blight" badly; to-day, they are clear of it, although Mr. Pratt said:—"I am sure it would soon break out again if we omitted changing our seed from Scotland, or spraying at least three times. . . . In England, we often have to accept £2 per ton f.o.b. on the railway for our potatoes, and can make a profit at that price, because we get such good crops, due to *continuous spraying,* which keeps the plants growing until the very last, and in odd cases we have had to mow off the tops to ripen the crop."

The Director of Agriculture pointed out that, under the existing regulation of the Commonwealth, potatoes are prohibited from Great Britain and all countries in which Irish blight is known to exist. The relaxation of such prohibition is a Federal matter.

SUCCESSFUL EXPERIMENT WITH DISEASED SEED POTATOES.

Mr. E. H. Stanton, of Tambas Springs, near Stanthorpe, has lately been making the experiment of growing potatoes from seed badly affected with scab. The seed potatoes were so badly diseased that he had intended feeding them to his pigs. But the idea struck him to try them in the same ground where they had previously grown. Writing to an official of the Department of Agriculture and Stock on the results of the experiment, Mr. Stanton says: "The resulting crop came out perfectly clean on a plot of about three-quarters of an acre, and the method I adopted may possibly be of some use to potato-growers. The seed must be whole. Prepare a solution of 3 lb. of bluestone dissolved in hot water, and then add 40 gallons of clean water. Make up the solution in a tank or other vessel large enough to hold the above quantity of water. Into this plunge the potatoes, and allow them to remain in the solution for two hours. Then take them out, and while wet sprinkle them with a good coating of sulphur. The same water may be used several times. I intend to put all my seed potatoes through this treatment this year."

Mr. Stanton, in giving us permission to publish this, has done what we should like to see all farmers do, and that is, make experiments for themselves, without waiting for the Department to do it for them. There are many farmers and fruit-growers who do so experiment, and we shall be only too pleased to publish the results, whether successful or unsuccessful. Much may be learnt from a failure as well as from a success. We trust that other farmers will try Mr. Stanton's method, when planting next season's crop, and forward to us information as to the results.

KEEPING ONIONS.

Onion-growers usually find that if, owing to a slow market, onions have to be held over for any length of time, the chief difficulty is their liability to sprout. This must, if possible, be avoided, because, whenever growth is set up in any bulb or seed, that seed deteriorates in proportion to the extent of growth. Any one who has tried to eat an old seed potato, which has been inadvertently gathered up with a new crop, will be aware of this fact. Onions, when pulled, should not be stored away at once, but should be left on the ground for a few hours to dry. Then they should be put away dry, in the coolest shed or barn available. They require constant looking over to sort out any bad ones, for, as in the case of fruit, such as oranges, apples, pears, &c., a single rotting onion will infect all those in its immediate neighbourhood. It used to be the custom, and probably is to this day the custom in the good, old-fashioned farm-houses in the old country, to hang the onions in strings to the kitchen rafters in company with hams, flitches of bacon, &c. This hanging in strings is a good plan where it is only a question of keeping a few for home consumption, but, in the case of many tons, the labour entailed would not be recompensed by the profit.

In an article on this subject in a French journal, mention is made of an observation of great importance which deserves the attention of farmers and market gardeners. After some experiments made on ten plots manured with chemical fertilisers, the resulting crops of onions were put away in bags and carefully numbered with a view to planting them out in the following spring to obtain seed from them. When the time for planting had arrived, it was found, to the astonishment of all concerned, that, under identical conditions of temperature and light, certain

lots had sprouted, and were exhausted by young, premature shoots, whilst the other lots still remained hard and solid without a trace of a shoot. The collections having been carefully ticketed, it was easy to prove that the produce from plots deprived of sulphate of potash were exhausted by a too hurried vegetation, whilst that which had received the potash manure was perfectly preserved. Such experiments are well worth repeating, and it would be to the advantage of the agricultural world if those few advanced farmers who make such trials of fertilisers would publish the results of their experience.

In August or September onions in the Southern part of the State should be ready for market, therefore any advice as to the keeping of the crop, if found necessary, should be acceptable to growers. One hundredweight of sulphate of potash per acre will have the effect above described.

POTATO-GROWING.

The "North British Agriculturist" published lately the following results of some experiments in potato-growing carried out at the University Farm, Cambridge, England; the experiments were undertaken to show the advantage of a change of seed:—

Variety.	History of Seed.	Total Crop.		Increase due to Change.	
		Tons	cwt.	Tons	cwt.
Up-to-date	Five years in Cambridge	4	17	...	
Up-to-date	Fresh from Cromarty	14	13	9	16
British Queen ...	Three years in Cambridge	5	3	...	
British Queen ...	Fresh from the Lothians	15	13	10	10
Northern Star ...	Three years in East Anglia	4	15	...	
Northern Star ...	Fresh from the Lothians	17	13	12	18
Factor	Three years in Cambridge	10	10	...	
Factor	Fresh from the Lothians	15	8	4	18
Factor	Grown in Cromarty, 1904, from Cambridge Seed	11	12	...	
Factor	Grown in Norfolk, 1904, from Cambridge Seed	9	6	2	6

PEANUTS IN HAWAII.

The peanut industry in Hawaii appears, from a bulletin just published by the Hawaiian Agricultural Experiment Station, to thrive exceptionally well in that territory. Recognising the possible value of the improved peanut to Hawaiian agriculture, the station, in 1908, imported from a leading grower in Virginia 150 lb. of choice seed of the following varieties:—Spanish, Bunch Jumbo, Running Jumbo, and Virginia Creeping. The seed was widely distributed over the islands, and a number of favourable reports were received, showing that the peanut would thrive over a wide territory. The best results appear invariably to have been obtained on light soils with moderate moisture. Heavy soils and wet locations proved, in most cases, unsuited.

Planted in the Manoa Valley in a well-prepared virgin soil of a medium gravelly loam, which was covered with a heavy growth of guava the previous year, the crop grew luxuriantly and proved of easiest possible culture. By using select shelled seed, strong germination and a full stand were obtained. The crop was planted in July. Two seeds were planted in a hill, 1 ft. apart, in rows 4 ft. apart. This permitted of horse cultivation up to the flowering stage, after which the crop received

no further attention until harvested. The general crop matured in about 150 days, the Spanish variety matured somewhat earlier, but all varieties were dug at the same time. Harvesting was facilitated by loosening the plant with a broad-tined spading fork thrust under the hill, which permitted pulling out the plant with practically all the nuts adhering. Calculated to acre yields, the following results were obtained:—Spanish: 1,965 lb. nuts, 2,550 lb. cured tops. Bunch Jumbo: 1,450 lb. nuts, 2,925 lb. cured tops. Running Jumbo: 1,680 lb. nuts, 3,370 lb. cured tops. Virginia Creeping: 1,760 lb. nuts, 3,150 lb. cured tops. In this experiment the two Jumbo varieties gave the smallest yields of nuts, due to the fact that the fine large pods consisted of a large percentage of "pops" (empty pods). Excellent as were these yields, there can be no question but that a considerably increased yield would have resulted from closer planting —for the Spanish variety, say 2½ ft. and the other varieties 3½ ft. apart. The crop sold readily at 6 cents per lb. except the Spanish variety, which was sold in part at 5 cents per lb., and the balance was retained for home use in preference to any of the other varieties. The cash value of the nuts calculated to acre yields alone was as follows:— Spanish, 98.00 dollars; Bunch Jumbo, 87.00 dollars; Running Jumbo, 100.80 dollars; Virginia Creeping, 105.60 dollars. The cost of production up to the time of harvest did not exceed 20.00 dollars per acre, but the cost of stripping the nuts from the vines and sorting them afterwards amounted to almost 2 cents per lb., or an average of approximately 35.00 dollars per acre. This makes a total cost of about 55.0 dollars per acre to place the crop in bags ready for market. Doubtless this expense would be materially lessened with a more extended experience, especially if women and children could be employed for the lighter but more tedious work of picking and sorting the nuts. In the above estimates no credit has been allowed for the cured tops. These gave an average yield of approximately 1½ tons of cured fodder per acre. At a low estimation these should be worth 12.50 dollars per ton, or an added value of 18.75 dollars per acre, about the cost of producing the whole crop up to the harvest stage. Numerous reports of the profitable culture of the peanut for home use have come to the station. The Kamehameha girls' school recently reported harvesting 93 lb. of sound nuts from a piece of ground 26 x 50 ft. square. This is equivalent to over 3,000 lb. of nuts per acre. Whilst the work of stripping the nuts was found the most difficult part of their culture, here as elsewhere, it was in this case overcome by student labour, a suggestion for the utilisation of our large population of school youth during vacation periods. To those acquainted with wholesome and profitable employment created by the lighter work about the orchards, vineyards, and hop-fields in California and elsewhere, this suggestion will not seem impracticable.

Where the price of nitrogenous feeding stuffs is high, the fodder value of the plant, including the nuts, may prove more valuable than for any other purpose. With live hogs at 5d. per lb., there would appear to be more profit in feeding the crop to pigs than in disposing of the crop otherwise. The Alabama Experiment Station found that pigs run on peanut pasture produced 1 lb. of pork on the following amounts of grain:—Peanuts, 1.77 lb.; cowpeas, 3.07 lb.; sweet potatoes, 3.13 lb.; sorghum, 3.70 lb. The Arkansas Station reports that one-fourth of an acre planted to peanuts produced 313 lb. of pork as compared with 109 lb. from a plot of the same size planted to corn. Many other results could be quoted to show the superior feeding value, pound for pound and acre for acre, of peanuts over any other feed that can be grown where peanuts thrive. Analyses have shown peanut hay to have a higher feeding value than wheat hay, and approaching that of lucerne.

SPECIFICATION OF LABOUR AND MATERIAL FOR THE CONSTRUCTION OF AN UNDERGROUND RESERVOIR FOR THE STORAGE OF WATER IN ACCORDANCE WITH THE ACCOMPANYING DIAGRAMS.

By ARTHUR MORRY.

The size of the tank when completed will be 12 ft. internal diameter and 15 ft. deep from the ground line to the floor level, or 14 ft. deep from the floor to the water level, and its capacity will be 10,000 gallons.

Excavate the ground to the diameter and the depth shown, and cart away all surplus earth, sides of excavation to be kept plumb and truly circular, so as to allow walls to be not less than 6 in. thick.

Excavate for and lay the drain to the tank as shown.

Concrete to be composed of 1 part Portland cement to 6 parts clean fresh water, gravel, and sand, well mixed together, turned over—twice dry and twice wet—and well rammed in position, so as to make it thoroughly solid and watertight when set.

The mode of procedure should be as follows:—

Provide a gauge-box made of rough pine boards 3 ft. 0 in. x 3 ft. 0 in. x 1 ft. 0 in. deep, sides only, without top or bottom. On a prepared floor of planking or other hard material, place the box and fill it three times with gravel and sand; then add one cask of cement, and turn it over twice and mix thoroughly; then add water with a watering-can sufficient to make it soft, and again turn over twice and mix thoroughly, when it is ready to be placed in the moulds. No stones should be larger than 1½ in. in diameter for walls of 6 in. thickness, and it is better if they do not exceed 1 in. The sand should be of a coarse grain and free from loam, and sufficient in quantity to fill in all the interstices between the stones, with a little to spare. This ensures good and strong work.

If preferred to mix smaller quantities at one time, one bag of cement, which is one-third of a cask, may be mixed with one gauge-box of gravel.

Provide a mould or template for building up the walls, composed of two rings made of 1-in. pine cut into segments of circles and bolted together so as to form a complete circle of 12 ft. in diameter; fasten these together at intervals with battens so as to form a skeleton frame 3 ft. high; then sheet the back of same with 4-in. by 1-in. pine, thus making a mould 3 ft. high, which will form the inner face of the wall. This may be made in sections convenient for handling, and must be raised and secured in position by props, as soon as the concrete filling behind same has set.

The floor should be 6 in. thick, laid at one operation and thoroughly well rammed. Walls should also be 6 in. thick, filled in behind the mould, and thoroughly well rammed, any inequalities in the excavation behind the mould to be filled in with concrete. This will cause the back of the wall to be somewhat irregular, but is rather an advantage than otherwise.

The tank may be covered in various ways, but the best method is to provide 4-in. by 3-in. steel joists and place same on top of wall at ground level, then place 2-in. x 3-in. steel joists cut in short lengths to rest on the flanges of the others, interlace between joists with Mitchell's wove wire K pig-fencing, 6-in. mesh, and 27 in. wide, leaving a man-hole in the centre 2 ft. 6 in. x 2 ft. 6 in.; place under this a platform of rough boards, supported with stays from the bottom, and fill in on top of same with concrete as before, 5 in. thick, well rammed; so as to form a smooth and fair face on top, one half of this platform or centreing may be first used, then removed to the other half if preferred.

Render the whole of the floor and walls up to the water line with cement compo. half an inch thick, in the proportions of 1 part cement to 2½ parts clean fine sand, and run fillet round the bottom at intersection of walls and floor; finish off face of walls with the wood float.

Remove all centreing from the inside, clean out all rubbish, and afterwards give the walls and floor two coats of the following solution, which will make it impervious to moisture:—Dissolve 12 lb. of alum in 30 gallons of water; then add 2 lb. of soft-soap, mix well and lay on with a brush, allowing time for the first coat to dry before laying on the second.

The quantities of materials required are given below:—

76 yards cube excavating.

16 yards cube of concrete, requiring 18 yards gravel and 18 casks or 54 bags of cement, at 15s. per cask, Brisbane.

72 yards sup. cement rendering to walls and floor, requiring 3 casks or 6 bags of cement and 2 yards cube of sand.

2 13-ft. 4-in. x 3-in. steel joists, weighing 9.5 lb. per foot.

2 11-ft. 4-in. x 3-in. steel joists.

48 ft. 3-in. x 3-in. steel joists, cut in short lengths in twenty pieces, 8.5 lb. per foot.

50 ft. lineal of Mitchell's wire wove fence.

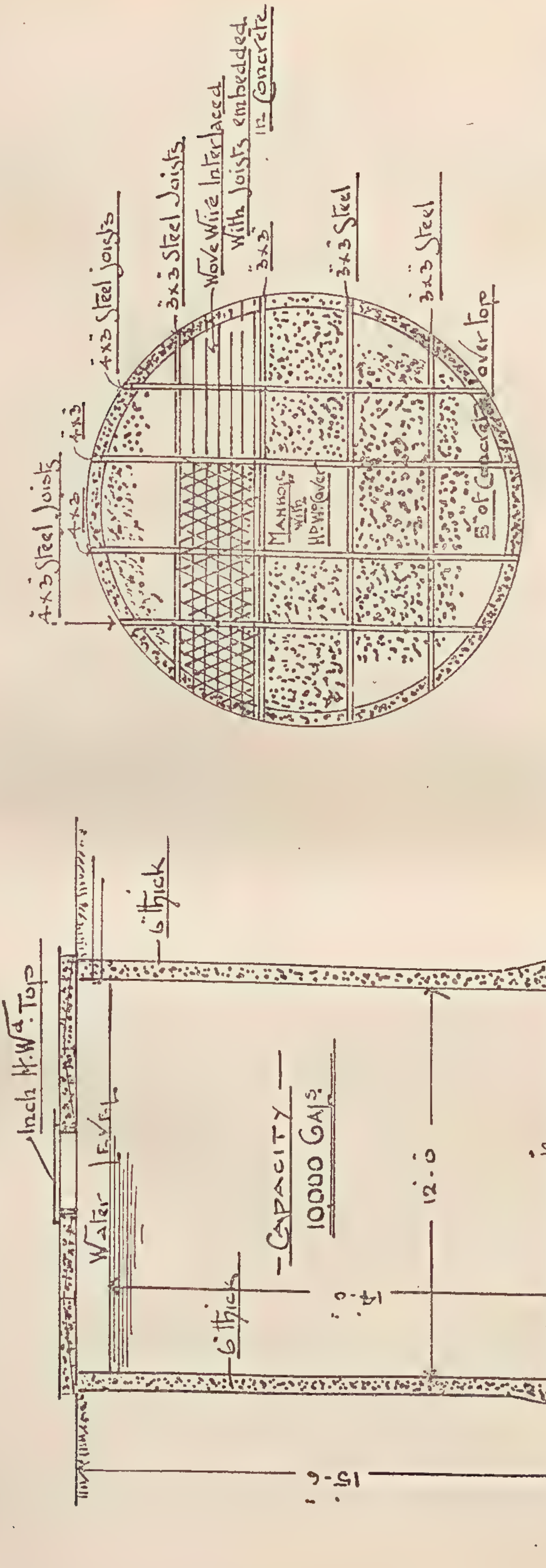
12 lb. alum, 2 lb. soft-soap, with brush.

1 hardwood man-hole cover.

1 length of 6-in. earthenware pipe built in wall.

A sufficient quantity of pine timber to make the moulds and centreing.

— PLAN OF UNDERGROUND WATER TANK —



— PLAN-OF-TOP-OF-TANK —

— SECTION OF TANK —

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF APRIL, 1911.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
		Lb.		Lb.		£ s. d.
AYRSHIRES.						
Lady Margaret ...	4-2-1911	867	4·4	42·82	10d.	1 15 8
Linda	12-2-1911	970	3·9	42·21	"	1 15 2
Davidina	7-10-1910	588	5·7	38·37	"	1 12 0
Lerida	15-2-1911	877	3·8	37·13	"	1 10 11
Lark	22-12-1910	813	3·8	35·69	"	1 9 9
Conceit	17-11-1910	424	6·9	35·07	"	1 9 2
College Lass ...	23-8-1910	599	4·5	30·29	"	1 5 3
Queen Kate ...	12-12-1910	644	3·6	25·76	"	1 1 6
Eight cows ...	...	5,812	36·6	287·34	"	11 19 5
Average ...	...	727	4·6	35·92	"	1 9 11
Lady Margaret, Davidina, and Queen Kate, Imported—First calf.						
JERSEYS.						
Cocoa	1-5-1911	750	4·0	33·52	10d.	1 7 11
Careless	16-12-1910	534	4·8	28·88	"	1 4 1
Bee	14-1-1911	326	5·0	28·39	"	1 3 8
Bluebell	20-4-1911	472	5·0	26·64	"	1 2 2
Carrie	24-2-1911	629	3·6	25·16	"	1 1 0
Five Cows ...	...	2,711	22·4	142·59	"	5 18 10
Average ...	...	542	4·5	28·52	"	1 3 9
SHORTHORNS.						
No. 6	2-3-1911	584	6·4	43·91	10d.	1 16 7
Nellie II. ...	30-11-1910	788	3·6	31·52	"	1 6 3
Dot	26-12-1910	422	5·5	27·27	"	1 2 9
Three cows ...	...	1,794	15·5	102·70	"	4 5 7
Average ...	...	598	5·2	34·23	"	1 8 6
LINCOLN RED.						
Red Rose	1-3-1911	835	4·2	41·80	10d.	1 14 10
Pedigree—By Burton Spot (Shorthorn)—Grace (Shorthorn).						

GRADES.

Cow.	Breed.	Date of Calving.	Milk (lb.)	Test.	Butter (lb.)	At per lb.	Value.
							£ s. d.
Hettie	Ayrshire-Shorthorn	15-5-10	401	7·2	34	10d.	1 8 4
Comet	Grade-Holstein ...	15-1-11	594	4·2	27·93	„	1 3 3
Two Cows ...	...	...	995	11·4	61·93	„	2 11 7
Average ...	...	...	498	5·8	30·97	„	1 5 10

AVERAGES FOR MONTH OF MAY.

No.	Breed.	Milk (lb.)	Test.	Butter (lb.)	At per lb.	Value.
						£ s. d.
8	Ayrshire	5,812	36·6	287·34	10d.	11 19 5
5	Jersey	2,711	22·4	142·59	„	5 18 10
3	Shorthorn	1,794	15·5	102·70	„	4 5 7
1	Lincoln Red	835	4·2	41·80	„	1 14 10
2	Grades	995	11·4	61·93	„	2 11 7
19	...	12,147	90·1	636·36	„	26 10 3
	Average	639	4·7	33·5	„	1 7 11

Average cow value £1 7s. 11d. for month of May, 1911.

A daily ration, consisting of 30 lb. chaff (mixed lucerne and oaten), 3 lb. bran, 3 lb. pollard, 4 lb. boiled barley, and ½ lb. oil cake, was fed to the following cows:—Davidina, Lerida, Lady Margaret, Queen Kate, College Lass, Linda, Nellie II., Red Rose, and Lark. The remaining cows received 24 lb. of ensilage daily, and grazed on the natural pastures.

CURING BACON MILD.

We lately gave a correspondent a recipe for making mild-cured bacon, which tallies almost exactly with the following method adopted by the chairman at a recent agricultural meeting at Quorn (South Australia). Mr. Thompson, the chairman, then read a paper setting forth a method of preparing mild-cured bacon of golden colour. In this method our correspondent will note that the salt has to be brushed off, whilst in our recipe the salt should all have disappeared before applying water.

Mr. Thompson said:—"Choose a cool day for killing, and let the pig rest quietly for twenty-four hours beforehand. Scald quickly in water 3 parts boiling hot to 1 of cold. Take the carcass out quickly, and scrape every part clean. Hang up, open, and remove entrails as speedily as possible. Despatch at this stage is of the greatest importance. Remove the leaf lard so that the carcass may cool quickly, and hang it in a cool place for twelve hours. When cut up, lay the sides with the flesh upwards. Sprinkle with salt and saltpetre, and leave for three or four hours. If curing is done in pickle, there is no need to rub the bacon when applying the salt and saltpetre, but care must be taken not to wash off the salt. Leave the meat in the pickle forty-eight hours. The blood should be

worked out of the veins at the time of first moving the meat, working downwards from the knuckles. Then replace in the pickle, putting what was at the bottom of the vessel on the top, and *vice versâ*. This changing of the sides should take place each day for nine days. Large stones may be placed on the sides to keep them under the pickle. After this they may be stacked one on the other on a floor or a bench, and moved every alternate day three times. Then brush off all salt and soak in cold water for twelve hours. Change the water, and leave for six hours. Then wash in plenty of hot water, brush well, string up, and wipe with a dry cloth. When dry, trim off loose pieces of flesh from the surface of flesh sides. Wipe over the skin with a little olive oil on a cloth and place the bacon in the cool smoke of kauri sawdust. The latter must not blaze. A little saltpetre sprinkled on the sawdust will give the skin a nice bright appearance. After smoking, clean the skin with an oily rag, and wipe finally with a clean cloth."

Mr. Thompson added that it might be thought that a good deal of this work was unnecessary, but in his opinion the extra price realised for bacon cured in this way made it worth while.

One farmer expressed the opinion that it was difficult for farmers to prepare as good a sample of bacon as the factories turned out. The flies were a great nuisance to contend with. Rolled bacon kept best and did not dry so much as the sides.

ABERDEEN-ANGUS CATTLE AND THEIR CROSSES.

THE FAT STOCK SHOW RECORD.

We have for some years past published a review of the achievements of Aberdeen-Angus cattle and crosses of that breed at the British fat stock shows. Looking back over these reviews one is struck with the remarkable record which they constitute of the outstanding success of the Aberdeen-Angus and its crosses—a record which far outshines that of any other breed, and which indeed in some respects beats the combined record of all other breeds of British cattle. Of the season that has just closed nothing new can be written, only further laurels of tribute have to be added to the already richly emblazoned rôle of honour which by their meritorious doings in fat stock show circles the cattle of Aberdeen-Angus breeding have won for themselves. Not only in the Old World but in the New, the year has again seen the Aberdeen-Angus breed proclaim its superiority over all competitors in the realm of meat production.

The Aberdeen-Angus breed and its crosses formed quite the features of the London Smithfield show, and for the tenth time during the last eighteen years the breed, thanks to the marvellous, complete, and charming little heifer shown by Mr. J. J. Cridlan, of Maisemore Park, again achieved the notable victory in competition with representatives of twelve other breeds of carrying off the supreme championship of the show. This animal of course also won the prize for the best heifer; while reserve for the best ox in the show was a steer bred three parts to Aberdeen-Angus stock. One of the most keenly contested competitions in the show is always that for the best animal under two years old, which proclaims the early maturity of the winner. Heading this important list came a yearling Aberdeen-Angus steer. The supremacy of Aberdeen-Angus in regard to early maturity is clearly brought out by the following table,

which gives the average weight of the yearling and two-year-old steers of the leading beef breeds at the recent Smithfield show:—

STEERS UNDER TWO YEARS OF AGE.

Breed.	Average Weight. Cwt.	Qr.	Lb.
Aberdeen-Angus	13	0	13
Crosses	12	2	17
Shorthorn	12	2	4
Hereford	12	1	20
Galloway	10	2	10

STEERS UNDER THREE YEARS OF AGE.

Aberdeen-Angus	16	3	25
Shorthorn	16	3	1
Hereford	16	1	11
Crosses	15	3	5
Galloway	15	0	7

There were altogether in the cross-bred classes fifty-three entries, of which forty-one combined Aberdeen-Angus and Shorthorn blood, four were Aberdeen-Angus and Devon crosses, four were Shorthorn and Welsh crosses, two were Shorthorn and Galloway crosses, one was a Hereford-Shorthorn cross, and one was a Shorthorn Red Poll cross. The whole of the twelve money-prize winners were of Aberdeen-Angus and Shorthorn breeding, with one exception, which was an Aberdeen-Angus Devon cross, while three of the first prize winners, including the champion and reserve champion of the section, showing double crosses of Aberdeen-Angus blood. In the small cross-bred cattle class the champion and reserve champion were Aberdeen-Angus Dexter crosses. These facts show the popularity of the Aberdeen-Angus as a crossing animal, and its unique success as such, while there are also brought out the superior early maturing qualities of pure-bred representatives of the breed. The crosses of the breed were equally fortunate in the carcase competition, the champion carcase being that of a yearling steer by an Aberdeen-Angus sire and out of an Aberdeen-Angus-Shorthorn cross dam, while the reserve championship went to the carcase of a two-year-old steer, a first cross between Aberdeen-Angus and Shorthorn.

The breed well maintained its record at the Scottish National Fat Stock Show, both pure-bred Aberdeen-Angus and crosses of the breed carrying off every honour that was open to them. For the sixth time the Earl of Rosebery was awarded the championship of the show, and for the sixth time, too, it was carried off by a pure-bred Aberdeen-Angus animal. On the occasion of the other eight shows the championship has gone once to a pure-bred Shorthorn and seven times to crosses combining Aberdeen-Angus and Shorthorn blood. In the competition for the best steer the principal competitors were a three-parts Aberdeen-Angus steer, a two-year-old Aberdeen-Angus steer, and a yearling Aberdeen-Angus steer, so that the breed was very well represented in the fight for the male championship, and for the third time a yearling of the breed carried off this trophy. The whole of the twelve money prizes in the cross-bred section were won by animals with a large percentage of Aberdeen-Angus blood in their veins, with the exception of one prize—a third—where Shorthorn blood predominated. As further bringing out the property of early maturity of the Aberdeen-Angus cattle, it may be mentioned that the heaviest yearling steers in the various sections showed the following weights:—Shorthorn, 14 cwt. 31 lb.;

Galloway, 11 cwt. 85 lb.; cross-breds, 14 cwt. 40 lb.; and Aberdeen-Angus, 14 cwt. 51 lb., giving the advantage to the last named breed; while the heaviest animal in the show was a two-year-old Aberdeen-Angus steer, which gave the great return of exactly one ton.

At the Birmingham show the breed just missed champion honours, but Mr. Cridlan's Aberdeen-Angus heifer, Clasp 2nd, was reserve for that honour, gaining also the cups as the best animal bred by exhibitor, with a cross steer out of an Aberdeen-Angus dam reserve. The best animal under two years of age was a cross steer out of a cross-bred Aberdeen-Angus dam, and the best Scot was Mr. Cridlan's Aberdeen-Angus heifer. The Norwich show provided not only an Aberdeen-Angus champion, but a reserve champion of the same breed, these two also having the same place for the best heifer, the reserve in this case also gaining the prizes for the best animal bred in Norfolk and the best animal bred and exhibited by a Norfolk farmer. At the Redhill show three Aberdeen-Angus cattle bred at Langshott, two of which were exhibited by their breeder, made a clean sweep of the championship prizes, while at Tonbridge the breed again supplied the championship. At many of the other more local shows the leading prize-winners were of Aberdeen-Angus breeding. At Inverness the breed supplied the best animal exhibited by a tenant farmer and the reserve champion of the show, while at Aberdeen every possible honour was won by the Aberdeen-Angus breed and its crosses.

It was admitted on all hands that the classes by Aberdeen-Angus sires were the finest section at the Royal Dublin Fat Stock Show, and certainly crosses of the breed gave a good account of themselves in the principal awards, of which, indeed, they made a clean sweep. The prize for the best outfed animal went to an Aberdeen-Angus cross ox, while a cross between the Aberdeen-Angus and the Shorthorn was reserve. The corresponding prize for infed cattle went to an Aberdeen-Angus cross heifer from Dunmore, which also won the championship of the show. An ox by an Aberdeen-Angus sire also won the special for the best animal under two years of age.

Then, at the Chicago International Show—the Smithfield of the New World—the breed carried off every possible honour, the championship of the show, the carload championship, and the carcase championship—a most notable and most noteworthy record.

The above facts must be most gratifying to breeders of Aberdeen-Angus cattle, bringing out as they do the popularity of the breed for crossing purposes and the superiority of the breed as regards quickness of growth to maturity and excellence of finish for the butcher. The chief points in the breed's record for the past show season may thus be summarised :—

Smithfield.—Championship of show. Best heifer in show. Reserve best steer in show. Best animal under two years of age. Champion carcase. Reserve champion carcase.

Edinburgh.—Champion of show. Reserve champion of show. Best heifer in show. Best steer in show. Reserve best steer in show. Best yearling in show. Best cross-bred in show. Reserve best cross-bred in show. Heaviest animal in show.

Birmingham.—Best Scot. Best animal bred by exhibitor. Reserve best animal bred by exhibitor. Reserve champion of show.

Redhill.—Best steer of any breed except Sussex. Best animal under two years. Best animal exhibited by tenant farmer. Best heifer of any breed except Sussex. Championship of show.

Norwich.—Champion of show. Reserve champion of show. Best heifer. Reserve best heifer. Best animal bred in Norfolk. Best animal bred and exhibited by a tenant farmer.

Tonbridge.—Champion of show.

Inverness.—Best animal exhibited by tenant farmer. Reserve champion of show.

Aberdeen.—Champion of show. Reserve champion of show. Best animal exhibited by tenant farmer. Best butchers' animal. Reserve best butchers' animal. Best ox bred by exhibitor. Best heifer bred by exhibitor.

Dublin.—Best outfed animal. Reserve best outfed animal. Best infed animal. Champion of show. Best animal under two years of age.

Chicago.—Champion. Champion carload. Champion carcase.

SUMMARY OF RECORD IN 1909.

Norwich.—Best steer over all breeds. Best female over all breeds. Champion animal over all breeds. Reserve champion over all breeds.

Inverness.—Champion over all breeds.

Forres.—Champion over all breeds.

Aberdeen.—Champion over all breeds. Reserve champion over all breeds. Best heifer in show. Best ox in show. Best butcher's animal. Best cow in show. Best bull in show.

Birmingham.—Champion cross. Second best animal bred by exhibitor. Champion over all breeds.

Edinburgh.—Second best steer over all breeds. Best and second best heifer over all breeds. Champion animal over all breeds.

London.—Best and second best cross. Best yearling over all breeds. Best and second best steers over all breeds. Best and second best heifers over all breeds. Best and second best animals bred by exhibitors. Champion and reserve champion animals over all breeds. Champion carcase.

Redhill.—Champion over all breeds.

Tonbridge.—Second best animal over all breeds.

Leeds.—Champion and reserve champion.

Dublin.—Best heifer. Reserve champion.

Chicago.—Champion and reserve champion over all breeds.

SUMMARY OF RECORD IN 1908.

Norwich.—Best ox. Reserve ox. Best heifer. Reserve heifer. Champion. Reserve do.

Birmingham.—Best yearling. Best cross. Best Scot. Best butcher's animal. Champion of show.

Edinburgh.—Best steer. Best heifer. Champion. Reserve champion.

London.—Best yearling. Reserve yearling. Best steer. Reserve steer. Best heifer. Reserve heifer. Champion. Reserve do. Champion carcase.

Dublin.—Champion. Reserve champion.

Chicago.—Champion animal. Champion car-lot. Champion steer herd. Champion carcase.

SUMMARY OF RECORD IN 1907.

Aberdeen.—Champion of show. Reserve do. Best heifer bred by exhibitor. Best butcher's animal.

Edinburgh.—Best steer. Reserve do. Best yearling. Best heifer. Reserve do. Best animal bred by exhibitor. Reserve do. Champion animal. Reserve do.

Birmingham.—Best cross. Best yearling. Best Scot. Reserve do. Reserve champion.

London.—Reserve best yearling. Best heifer. Reserve champion. Champion carcase.

The above is published by The Aberdeen-Angus Cattle Society, Banff, Scotland.

CHARACTERISTICS OF DAIRY COWS.

Everyone is familiar with the more usual qualities which dairy cows should possess as a rule, and which have often been described. But there are a number of less well known and less often remarked characteristics which are thought by practical writers on the subject to be of some significance, the fact being that dairy and maternal qualities are of so subtle and far-reaching a character that they influence the conformation of the body in a great variety of ways.

To quote the words of a noted American dairyman when striving to produce a profitable dairy cow: "We must breed and develop an enlarged function of maternity; the dairy cow is an animal with an enlarged talent for the exercise of maternity, and the dairy form and outline are essential to the work of a dairy cow." That these functions are largely connected with the nervous system explains probably to what a large extent dairy characteristics attach themselves to external features, and the "nervous theory" which was brought out some while ago by the above-mentioned authority helps to make this clear. It was to the effect that maternal qualities are closely connected with the nervous system; and that if we develop a race of cows which shows an increased tendency towards milk and butter-making, so in proportion do we increase both the nervous form or build and the maternal qualities, at the same time diminishing the heavy-going qualities of the fleshy type beast.

According to this theory, it will be seen that there is ample room for the opinions regarding the fairly pronounced distinctions which exist between the two types of animal, and the ideal dual-purpose cow will perhaps never be fully evolved.

Among the points referred to at the beginning of this article are such characteristics as are indicated by the conformation of the head and face, tail and thighs. The head is naturally of peculiar interest in this connection, and in a general way a long one is usually advocated, but there are differences of opinion on the point. Youatt commended length, but was no lover of *big* heads, which, he said, were seldom a good indication either of milk or beef, and a "small but long shape" which some have given as their ideal seems to be what he meant. One exponent of this subject, while admitting that it frequently means a good milker, goes so far as to say that a long head often implies a dull, apathetic, colourless animal, always the last of the herd to look out for herself, and this is hardly in keeping with the high development of brain power which has

been advocated by a noted expert, and which it may be supposed is derived from a highly-developed nervous system. But a long head in moderation seems to be generally approved by farmers—in the heavy breeds, at any rate.

The mouth is among the points to which reference is seldom made, but its importance is not perhaps appreciated, though it is not maintained that points such as these have necessarily anything to do with maternal qualities. Mr. Grisdale, the dairy expert at the Central Experimental Farm, Ottawa, referring to this point a few years ago before the Dairymen's Association, remarked that a strong jaw and a large mouth are probably the best indications you can get of a good dairy cow, provided that the other parts are right. This type of mouth, together with thick and strong lips, have been commended as indications of a good digestion, and if this is so they are, of course, valuable features, and are in keeping with a good clean face and bright forehead, which, together with an eye of the right sort, are, according to the same authority, indicative of the abundant brain power above alluded to. Even the nostrils are held to be of some significance, but perhaps only in so far as a good shape here would imply good breeding and lung power, the latter being a point apt to be underrated.

The tail is certainly a feature of interest, because it seems to indicate either flesh or milking proclivities, according to its setting on. While it is inadvisable, perhaps, for it to stand well above the rump, as some people like to see it, a sunk-in tail implies meat rather than milk, because of the general compact levelness which this formation carries with it. A very shrewd breeder is said to have remarked that he would always avoid a dairy bull with a tail sunk in flesh, and doubtless he was right.

RESULTS OF THE FIRST SIX MONTHS OF HERD-TESTING IN WEST MORETON.

Mr. E. Graham, Government Dairy Expert, supplied the following summary of his report on the results of the first six months of the herd-testing, as inaugurated by the Department of Agriculture and Stock:—

The work was commenced among the dairies in portion of the West Moreton district in October last, and in that locality 148 dairymen submitted their herds for testing in accordance with the conditions stipulated by this Department.

The number of milch cows submitted for testing is shown as	3,475
The number of composite milk samples tested is shown as	4,430
	Lb. per Cow.
The highest average yield of milk per diem for a herd	26·4
The lowest " " " " " "	5·4
Average	15·2
The highest average yield of commercial butter per diem for a herd ...	1·08
The lowest " " " " "	0·28
Average	0·66
	Per cent. Butter Fat.
The highest average butter fat contents of the milk of a herd is shown as	5·1
The lowest " " " " " "	3·2
Average	3·9

In comparing the earning capacity of the most and least satisfactory herd it will be seen that, taking the herds of, say, thirty cows each, and commercial butter at an average price of 9d. per lb. for the six months, the best herd earns £218 14s. gross, and the indifferent herd earns £63, while the average herd earns £133.

In other words, the best herd's earnings are over 10 per cent. greater than the earnings of the average and least remunerative herds taken together.

If the comparison was extended over a full period of lactation the disparity in the earning power of the best and worst herd would be infinitely greater, but I have made a comparison over a period agreeing with the length of the herd-testing operations.

A glance at these early results of herd-testing cannot other than impress dairymen of the fallacy of utilising animals of low productive qualifications.

The best herds can be further improved and made more productive, while the herds below them in productiveness should be promptly "culled," and the general standard of productiveness materially increased.

The pure-bred sire, descended from a family noted for its deep milking and high productive qualities, should certainly be brought into greater demand and prominence by the early results that have reached light by the work of the herd-testing officer.

As regards feeding of the dairy herds, the herd-testing officer's notes show that in the majority of cases the milch cows were grazed on natural pastures. Some herds had access to lucerne fields for portion of the day, while a limited number of dairymen fed their stock on imphee, sorghum, green maize, or panicum. Generally, dairymen are not providing green fodder for the milking herds, or do they adopt the silo as a means of fodder conservation.

Needless to add that, in instances where special care is taken in the feeding of the stock, a response from the cows in the milk yields is noticeable.

The practice of rugging the dairy herds for the colder months of the year remains neglected by the dairy farmers.

The work of the herd-testing officers does not end at the testing of the milk of the herds for the butter-fat contents; in addition, an analysis of the milks in the various districts is made, and the percentage of solids-not-fat in the milks is ascertained.

The average solids-not-fat contained in the milk analysed are well over the standard of 8.5 per cent., and of ninety-one samples of milk analysed eighty-four samples were higher or equal to the above standard, and seven samples were just under the standard; the lowest solids-not-fat content of the samples analysed being 8.2 per cent., while the average solids-not-fat of the whole of the milks treated is shown as 9.2 per cent.

It is, however, worthy of mention that the milks analysed were produced during the period extending over October to April, and when natural fodders were plentiful; therefore it would not be surprising to see later some diminution in the percentage of solids-not-fat that may be contained in the milks, particularly as the non-fatty solids are greatly influenced by the amount and nature of the available fodders for the milch cows during the time the samples are taken for analysis.

CATTLE BORN EAR-MARKED

Referring to our paragraph in the May issue of this Journal on the above subject, Mr. Jas. Armstrong, junr., Ivy Bank, Widgee, writes:—"*Re* your correspondent's article on calves born with natural ear-marks, I have quite a dozen in my dairy herd, all Grade Ayrshires, which were born with swallow-tailed marks in both ears. I have also seen many others in different places so marked. In my opinion, it has nothing to do with former artificial marking, but is simply a freak of Nature."

The Horse.

GRAZING MARES ON HORSE PASTURES.

"The horse-breeder wishing to breed the best should refrain from grazing his in-foal mares and young stock on pastures which have been continually and recently grazed by horses," once wrote Sir Walter Gilbey, Bart. "Preference must be given to fields in which horses have not fed for the last three years, and for longer if possible. Thus the dams and youngsters will obtain fresh, untainted food. The number of animals should be strictly limited in accord with the area of the stud farm, which should be sufficiently extensive to allow periodical changes to fresh land; one yearling to every five or six acres is the desideratum. The theory of fresh grazing has been tested among Shire horses by placing a certain number of mares, on their return from service by the best sires money could procure, upon land where the pasture was not fresh; in the following year the same number of mares, served by the same sire, under identically similar circumstances, have been placed on pastures which had been freshly laid down, or upon old grass land on which horses had not been grazed for several years. The produce in the latter case have been to an extraordinary extent superior in bone, muscle, and constitution to their brothers and sisters of the previous year." Sir Walter attributes their superiority to nothing else than their "nature's" feeding. These tests of the fresh-grazing theory have not been confined to one year with the next, but have run over several years. Is it too much to assume that Shire horses would be equally applicable to blood stock?—"Live Stock Journal."

LIVE STOCK IN THE UNITED KINGDOM.

In Part I. of the complete agricultural returns of 1910 the totals of live stock in the United Kingdom, including the Isle of Man and the Channel Islands, appear for the first time. Compared with those of 1909 they enumerate 2,094,587 horses, against 2,091,743; 11,765,453 cattle, against 11,761,830; 31,164,587 sheep, against 31,839,799; and 3,561,481 pigs, against 3,543,331. The inclusion of the figures for the small islands makes the comparison for 1910 less favourable than that of Great Britain and Ireland by themselves, as each of those small islands shows a decrease in horses, cattle, and pigs, while the Isle of Man has a decrease in sheep.

Bowen (North Queensland).

"Bowen belongs to the class of ports which Nature in a kindly mood predestined to commerce. Bowen is a very *protégé* of the sea. Its citizens are to be congratulated that the opportunity has been given them to concentrate their energies upon creating business, and transacting it in a site which Nature has favoured with such commodious shelter, and such a wide and deep channel to the sea."—[Extract from report on Queensland Harbours to the Queensland Government by Linden W. Bates, the famous Harbour Engineer, who is at present retained by the United States Government as advisor in the Panama Canal scheme.]

"Looking out upon this Nature's necklace of coral islands, Whitsunday Passage, you will find a little town which enjoys one of the loveliest prospects of the Colony—it is BOWEN. It stands on an elevation gently rising up from a fine harbour, while behind it there stretches an exceedingly rich country to the mountain ranges in the distance. Look where you may from this favoured spot, you see a combined prospect of the beauty and the natural wealth with which it is blessed.

"If I had the power to plant down 5,000 families, where they would find a rich soil, a sea teeming with fish and turtle, a climate warm but salubrious, and scenery of unsurpassed attractions, I would place them in Bowen."—[Extract from Michael Davitt's book, "Life and Progress in Australia."]

Founded in 1859, Bowen celebrated its Jubilee in 1909, and it then had a population—town and district—of under 3,000. This tortoise-like progress has earned for the place the name of "Sleepy Hollow." A harbour, which is recognised as being second only to Sydney in Australia, magnificent soil, goldfields within 50 miles, silver, copper, and coal numbered among its undeveloped resources (the latter thoroughly prospected by bore-holes under the direction of the Government geologist, revealing the presence of many workable seams of good coal).

What then is the reason for the stagnation? Partly want of enterprise on the part of its handful of people, the absence of any attempt to advertise the district, and the want of political influence. But principally, that the scanty stream of emigration from Great Britain has been directed to the southern parts of Australia.

During the past twelve months, however, there are signs that a great awakening is at hand. The completion of the railway to Proserpine now brings the whole of the trade of that prosperous sugar-growing district to Bowen. The extension of the railway to Ayr-Townsville, to be probably completed in 1912, and the extension of the meat-works at Merinda, 5 miles from Bowen, are tremendous factors for galvanising new life into the Port. The lack of sufficient berthing accommodation for steamers has somewhat hampered the trade of late, but the recent visit of the Hon. Mr. Barnes, Treasurer and Minister for Works, will

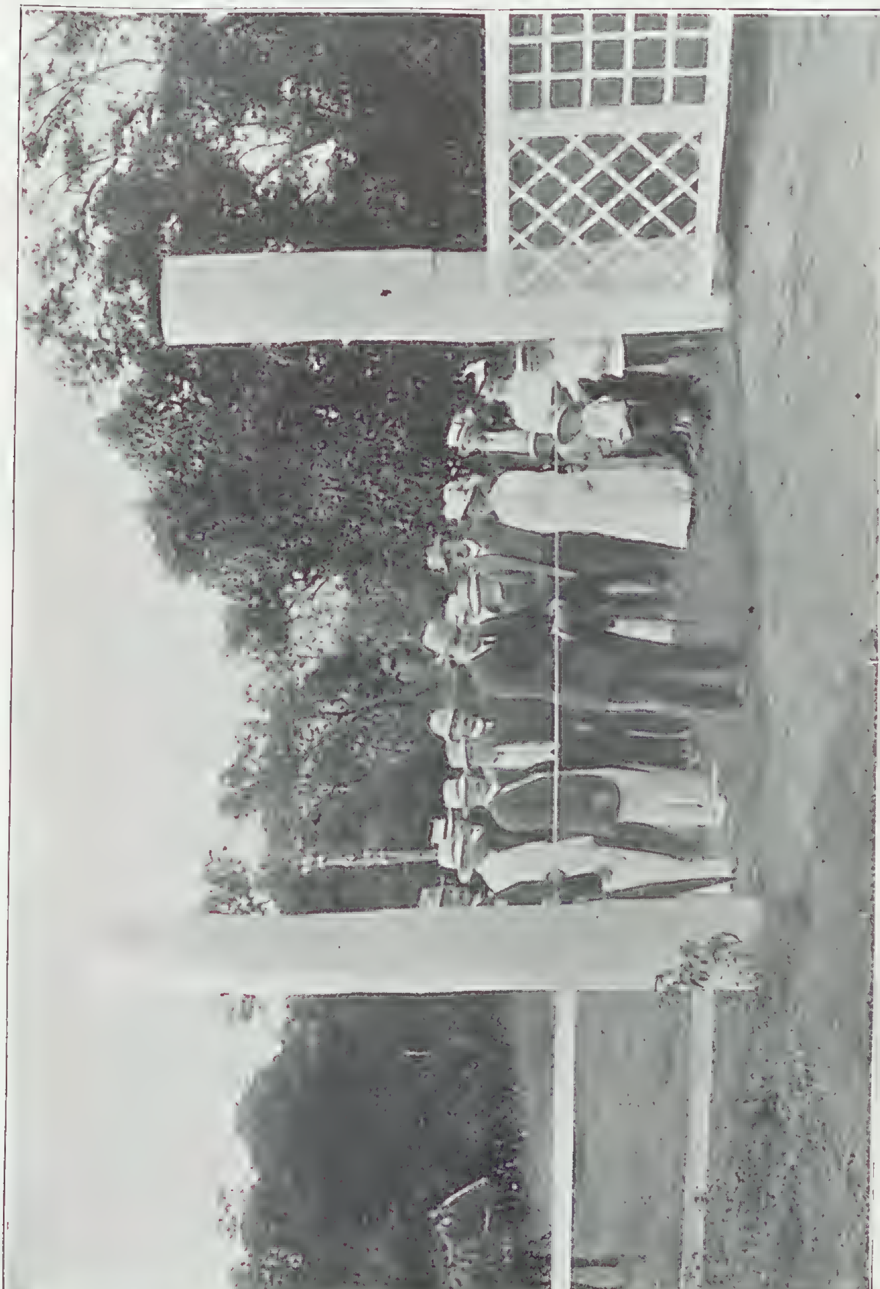
Plate I.

Bowen Harbour.

Plate II.

A Bowen Orchard, Twelve Months after Clearing the Virgin Forest.

Plate III.



The Minister for Agriculture, Hon. J. Tolmie, M.L.A., Christening Messrs. Colton and Adams' Plantation, Bowen.

doubtless remove this disability, as he is prepared to spend £10,000 on the jetty, the new piles of which will be built of ferro-concrete.

A large number of the mining population leaving Charters Towers are being attracted to the district, and it is estimated that nearly 150 families arrived in Bowen from those goldfields—the majority of whom have settled on the land. Probably the greatest impetus the district has received, however, was the cutting up of large estates quite adjacent to the town. The bulk of the lands have been purchased by small holders, but the largest development has been made on that block purchased by Messrs. Cotton and Adams, and comprising the whole of the river frontage between the railway bridge and Russell's crossing. These gentlemen were in quest of land suitable to the growing of citrus trees, and, after visiting every State in Australia, decided that the soil of the Don Delta was the most suitable, and the shipping facilities excellent.

To show what can be done with a little capital, combined with hard work, we have pleasure in now reproducing a photograph of the land as it appeared twelve months after being taken up in its virgin state.

During the Hon. Mr. Tolmie's (Minister for Agriculture) recent visit to Bowen, he formally christened the plantation, and a photograph of this interesting function is also published in this issue.

Experts agree that the soil of the Don Delta Groves is admirably suited to the growing of citrus trees and pineapples. It consists of rich river silt to a depth of 2 ft., with a similar stratum of coarse sand the same distance below, and under which is black soil to a depth of about 14 ft.

The young trees depicted in the photograph had only been growing a few months, whereas at the time of Mr. Tolmie's visit, on the first anniversary of the planting, these trees showed an exceptional growth, and were then 6 ft. high. At present there are 4,000 trees on the property, and arrangements have been made for planting an additional 2,000 during the current year.

From this it will be seen that practically the first attempt made in Australia to rival a Californian fruit ranch has been made in the Bowen district. The rainfall registered at the local post-office shows an average of 43 in. per annum, the bulk of which falls during the first three months of the year. Water is obtainable all over the Don Delta Groves at a depth varying from 14 to 30 ft., and the largest power pumps fail to exhaust the supply. These facilities for irrigation apply to practically all the agricultural lands in the district, and when the wonderful fertility of the Bowen lands are widely known, then the late Michael Davitt's prophecy—"that a great and handsome city will look out upon the Pacific and its cluster of fairy islands from Bowen"—will be realised. During the Hon. Mr. Tolmie's trip through the district, he was favourably impressed with what he saw, and said that if the farmers in the southern parts of Queensland had the same friable soil to deal with, the progress of the southerners would have been even more rapid than it has been.

The Bowen district is also justly celebrated for the flavour and the size of its pineapples, and as the main crop matures in November, the grower thus has a monopoly of southern markets for at least two months, and as it is at this season of the year the highest prices are obtained, the opportunity of the Bowen grower can be easily appreciated.

Papaw trees grow luxuriantly, and the cultivation of this fruit is one of Queensland's neglected industries. The granulated juice of the fruit finds a ready market in the United States, where it undergoes a refining process, and is sold for medicinal purposes. In the August, 1909, issue of this journal, the possibilities of the industry are fully dealt with, and the yearly value of the crop is estimated at upwards of £80 per acre.

The papaw trees shown in this illustration were planted in March, 1910, and one tree has produced to date upwards of 100 papaws, with an average weight of nearly 5 lb. each.

Cigar-leaf growing in North Queensland is also making great headway, and Mr. R. S. Nevill especially refers to the Bowen district as one of the most suitable for this class of crop. One of the largest areas planted under cigar-leaf was at Amelia Vale, a few miles from the port, and our illustration shows 14 acres under cultivation, which realised upwards of £1,000.

We may here mention a few facts to show what can be done with small holdings in this favoured spot. We quote the following statistics which are reliable:—

One orchard consisting of 8 acres has produced 4,000 cases of citrus fruits this season.

6 acres under irrigation produced 1,200 cases of cucumbers.

8 acres without irrigation produced 2,500 cases of tomatoes.

All of which produce reached Sydney and Melbourne markets in time for top prices.

It has often been alleged that Victoria is the Garden State, but Bowen alone exported last year to Melbourne nearly 50,000 cases of fruit and vegetables.

Owing to its peculiar geographical position, the climate of Bowen can only be described as delightful. The writer has lived in the district for upwards of two years, and on not one occasion during that time has the thermometer registered over 84 degrees in the house, and it is difficult to believe that the place is 3½ degrees within the tropics. The climate of Bowen more closely resembles that of Southern California than any other part of Australia, and there is no reason why Bowen should not be to the Island Continent what Los Angelos is to America—the city that has been built by the orange trade and the tourist traffic—and it shows a larger growth than any other town in the United States, increasing its population by over 200,000 during the past ten years.

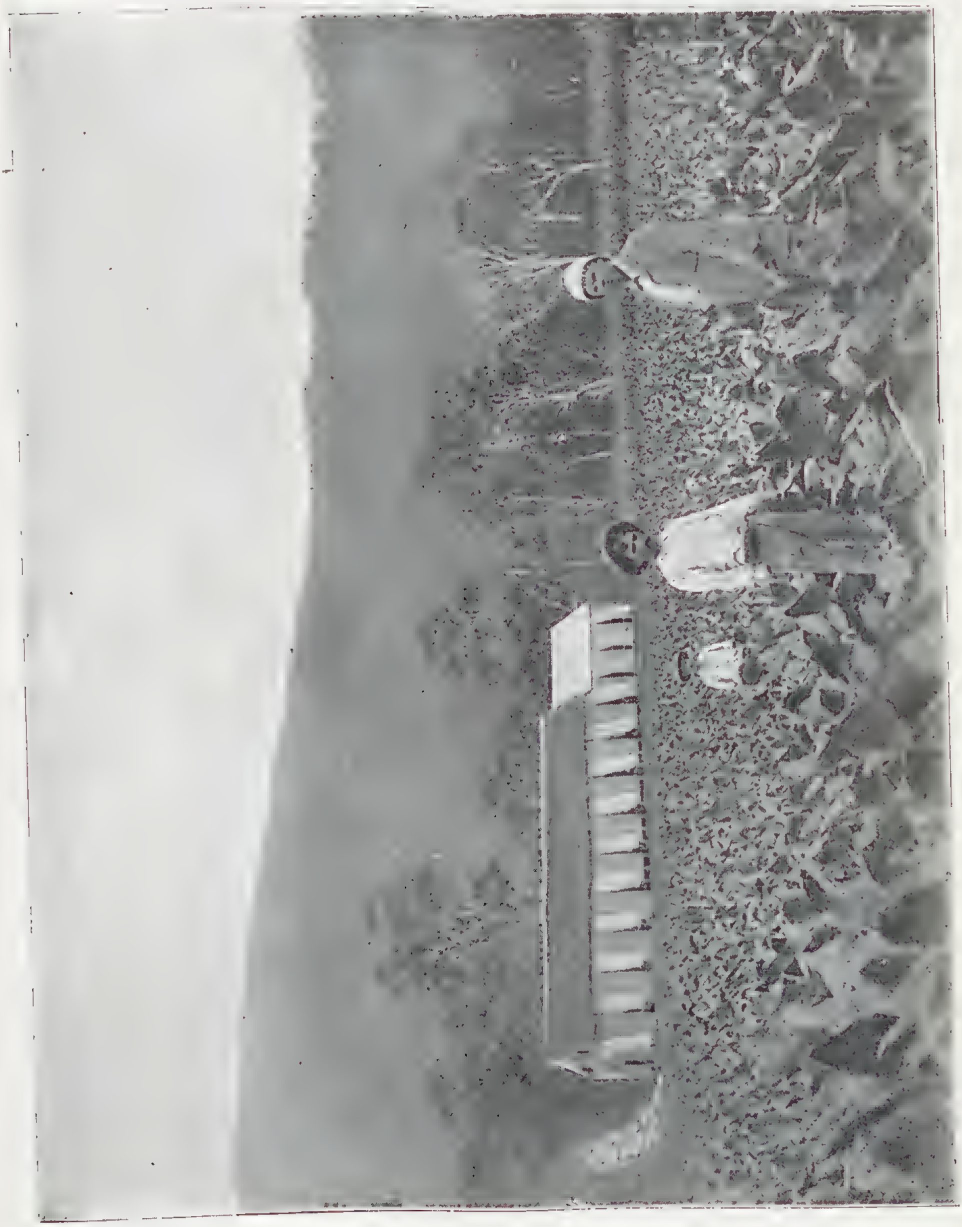
In our next issue we purpose publishing a second article on the Bowen district, with photographs illustrating a few of the older orchards, the initial stages of the sugar-cane growing, and the prospects of its extension on the Don River lands.

Plate IV.

Town Clerk and Mayor, Bowen. — Ferricks, M.P. — Hon. J. Tolmie, Minister Agriculture. — E G. Scriven, Under Secretary, Dept. Agriculture. — Rainford. Fruit Inspector, Bowen. — Eyre Massey, Chairman, Shire Council. — Carmody, Private Secretary to Treasurer & Min. Works.

Under the Papaw Trees, Bowen

Plate V.



TOBACCO PLANTATION, AMELIA VALE, BOWEN. MR. R. S. NEVILLE, TOBACCO EXPERT, IN FOREGROUND.

Tropical Industries.

THE SOY OR SOJA BEAN.

By H. NEWPORT, Manager, and C. E. WOOD, Overseer, the Kamerunga State Nursery, Cairns, N.Q.

As most of the numerous writings and articles on the Soy, Soya, or Soja bean (*Glycine hispida*) appear to be founded on reports of experiments and trials in other countries, the following notes and comments on experiments carried out in this country, albeit in the tropics and not as yet entirely conclusive, may prove of interest to those who have been attracted by the attention so frequent a reference to it in the Press recently has evinced.

The Soy bean is reported as being undoubtedly of very great value as a food both for man and beast, as an oil-producing grain, as a cover or auxiliary crop, as a fodder crop, and as a host for the nitrogenous bacteria which by means of the nodules on the roots add to the richness and value of the soil in which it can be grown. These attributes, if sustained, make the staple attractive to the Queensland settler, and it is obviously well worth ascertaining whether it can be grown successfully as a farm crop and its characteristics maintained in the Australian tropics, and these are the objects of the following experiments.

This article is not written with any idea of suggesting either the condemnation of the plant on the one hand or its success on the other hand, but is merely an impartial report and comment on the results of the experimental work in connection with it so far. It must be borne in mind that many of these legumes depend for their successful growth on the presence of the right kind of bacteria in the soil. Where these exist it will thrive and crop and at the same time add nitrogen to the soil, but where they are not yet to be found the plant will be much slower in establishing itself, though it may ultimately do so satisfactorily and prove exceedingly valuable.

This may be the case in Tropical Queensland, and to account for the very qualified measure of success attained so far; but at the same time this knowledge invites a continuation of the experiments, holding out as it does promises of greater success as a reward for perseverance.

The Soy bean is no new thing or recent discovery. Not only has it been cultivated in China and Manchuria for probably centuries, but its economic value has been recognised, and seed been introduced to various other countries many years ago. Its first introduction into the Queensland tropics, if not into the State, was in 1900, in November of which year a consignment was received at the Kamerunga State Nursery, Cairns, from the head offices of the Department of Agriculture in Brisbane. In September, 1901, also, the records show some Soy bean seed to have been included in a parcel of seed received from the Biggenden State Farm, indicating that a supply had also been sent to that Institution in 1900, and possibly, therefore, to other State farms and agricultural institutions. At neither place do the results of this seed seem to have elicited any special report or attracted attention. For a season or two subsequently seed was available here but seldom applied for, and results did not warrant its advocation as a farm crop. Seed was always available, however, from seedsmen. In January, 1909, a parcel of 2 lb. of fresh seed was obtained from Messrs. Anderson and Co., Sydney, and reproduced at

Kamerunga. Several rows were planted, and it did fairly well. The season was a comparatively dry one. The variety was a yellow, corresponding as nearly as possible to the description in the U.S. Department of Agriculture, Bureau of Plant Industry Bulletin No. 98, of the variety "Ito San." None of the plants exceeded 18 inches in height, and averaged somewhat less. They cropped well and grew quickly. The seed-pods ripened far more evenly and together than has been observed since, but the seed was inclind to be wrinkled and some of them discoloured, and on the whole smaller than the original seed. Altogether the planting showed that Soy would grow here, but experimentally the results were negative. Repeated sowings at the end of 1909 and up to the end of February, 1910, proved this seed to have lost its vitality.

During 1910 the following seed was obtained by the overseer, Mr. C. E. Wood, and the manager from time to time, and sowings made on the dates mentioned; notes on the results are also added:—

22nd May, 1910.—A yellow variety from Manchuria. Germinated 26th. Seed soaked two hours in cold water. Pods began to form 3rd July. Harvested, 9th August. Crop poor.

29th May, 1910.—A red variety from Shanghai. Germinated 2nd June; podding on 15th July. Seed not treated. Final harvesting third week in August. Only a few good seed obtained. Crop very poor.

29th May, 1910.—A yellow variety from Shanghai. Germinated 3rd June. Podded first week in July. Final harvesting third week in August. Very poor.

29th May, 1910.—A yellow variety from Manchuria. Two small lots were received from different individuals, but no difference could be found and they were mixed. Germinated 3rd June; podding first week in July. Harvested third week in August.

All the crops from these May sowings were very poor. The red variety attained only 6 to 8 in. in height, and the yellow and black up to 1 ft. Seventy-five per cent. of the seed harvested was shrunken and stained as though by wet, and was of no use. The original seed germinated well, but the plants never thrived. They were attacked by slugs and grasshoppers, and it was noted that where a young stem had been damaged by these pests while the pods were apparently normal the seed of these plants was invariably bad.

25th June, 1910.—One short row each of original (obtained or imported, not own grown) seed was sown in a plot of sandy soil of the following varieties:—

Black, from Shanghai: Germinated 1st July.
Yellow, from Manchuria: Germinated 1st July.
Yellow, from Japan: Germinated 2nd July.
Yellow, from Tolga: Germinated 1st July.
Red, from Shanghai, and Red, from Manchuria—these were apparently identical, and germinated together on 1st July.

With this experiment cowpeas were sown in adjacent rows at the same time for comparison. All the Soyas germinated well. On the whole the black was the best. Of the yellows the Tolga was the best, taking growth and grain together; but it was not made clear by the correspondent who sent these few beans whether the seed was imported or obtained from plants grown at Tolga on the plateau about 2,500 feet above sea level behind Cairns. If anything, the Japanese yellow gave the largest bean. These two yellows attained a height of 12 to 16 in. The red varieties were very poor, as on previous plantings. The cowpeas sown in a

similar manner and on same date were the Purple, Slate, and Clay varieties, from our own seed. These germinated on the 1st July, and were harvested two or three days before the Soy beans.

Cowpeas planted at this time of year (June-July) in these parts seldom make much green stuff and but few if any runners, but generally seed well. These were no exception. Nitrogenous nodules were limited on the cowpeas, and absent on the Soy beans.

The next sowing, still of original seed, was some two months later in trenched and well worked ground, as follows:—

31st August, 1910.—Yellow, from Japan; yellow, from Tolga; yellow, from Manchuria; black, from Shanghai; red, from Shanghai.

The seed of the red variety was by this time attacked by weevils. These germinated on the 6th September, podded in the second week of October, and were harvested in the third week of November. The best growth was by the black, which attained about 18 in. in height, with the Manchurian yellow next, averaging 15 in.

The red was twice sown, and both times died out when 2 to 3 in. high; on the second occasion largely due to beanfly attacking the stems.

During September of that year a parcel of 3½ lb. was received from the head office, which seed was obtained from Messrs. Anderson and Co., of Sydney, but whether imported or colonial grown did not transpire. This new seed was sown in two long rows in well prepared soil, as follows:—

14th October, 1910.—Yellow, from Brisbane. Germinated fairly well on the 19th. Plants averaged about 1 ft. high. Average pods to each plant, 21; bearing two beans to a pod. Crop small. Majority of top pods containing bad (shrivelled and small discoloured) seed, and lower pods good.

17th January, 1911.—A second planting of this seed was made (variety yellow, from Brisbane), in three long rows. Result: Only two or three germinated. Podded, 25th February. Very poor plants, and all beaten down by heavy rain.

During December (28th), 1910, a further supply of 5 lb. of yellow and ¾ lb. black Soy bean seed imported by the Department of Agriculture was received, and was sown, resulting as under:—

16th January, 1911.—Two rows each of black and yellow imported seed. Only a few germinated on the seventh day. The weather after planting was very hot, and heavy rain followed, washing the plants badly. Storms killed out the black, while the yellow was just able to survive.

The last sowing made was of the September and December seed received from the Department, together with some of the first of our own seed, as under :—

13th February, 1911.—Yellow (Manchurian, own seed): Germination very good. Yellow (Department, September seed): Germination very bad. Black (Shanghai): Germination very good. Red (Manchuria): Germination very poor.

These germinated on the 18th of February, and promised well, but unfortunately were annihilated in the cyclonic storms experienced in considerable force at the Nursery that month. New sowings are now being made, which will form the subject-matter of another paper.

Before summarising the knowledge gained from these experiments, it must be remembered that this has been an exceedingly wet season, with a rainfall considerably above the average, and also that the seed has been so far all imported or introduced from some locality whence a

more or less lengthy voyage was involved, detrimentally affecting the vitality of the seed.

Of the varieties tried none were received with any name attached. Several lots obtained from different sources appear, and probably are, identical in variety. An effort has been made to identify them with the described and illustrated American varieties.

Of the black, two lots were grown. One would seem to be identical with the variety named "Buckshot," and is about the hardiest and best here so far; the other has not been placed, but has flatter seed. Of the yellow seven lots in all were received, and all seem identical in every way and to correspond to the variety named "Ito San." This appears to be the commonest, and a good variety. The two lots of red could not be placed; they might be different varieties, but have done so uniformly badly, as compared with the others as yet, that they can hardly be judged. A few seed of a brown variety were obtained, but the seed being very hard and old its germination is doubtful.

SUMMARY OF RESULTS OBTAINED BY EXPERIMENTS IN OTHER COUNTRIES.

The results of experiments in New South Wales may be summed up as follows:—According to the "Agricultural Gazette" of October 1908, Soy beans were found to require a good loamy soil, well drained. Growers were advised to sow when all chances of frost are over, and then in drills $2\frac{1}{2}$ ft. to 3 ft. apart, with one plant about every 6 in., requiring 8 to 10 lb. of seed per acre. Quick varieties are stated to ripen in seventy-five to ninety-five days. The plants were found non-trailing in habit, and affording a longer season than cowpeas for feeding pigs, and bearing more seed, though allusion to the amount of crop is in the following words: "As high as 10 bushels to the acre has been harvested here," implying even lesser crops. The height of the plants is given as 2 to 5 ft., with pods 1 to 2 in. long and containing one to three seeds. The richness of its protein value is mentioned, and also that for silage twice its weight of green maize should be added.

Later (July, 1910) the fact of returns amounting to 47 bushels per acre from experiments in 1893 is given, and it is added that Soy has not shown it will thrive over such an extent of the State as cowpeas, and farmers are consequently advised only to test it in a small way to see if their district suits it.

The "Tropical Agriculturist," in January, 1910, in giving an extract from Bulletin No. 3 (1909) of the Imperial Institute, advises half to three-quarters of a bushel of seed per acre for five or six plants per foot in rows 2 ft. to 3 ft. apart. A yield of 22 to 40 bushels per acre is quoted, and advice to harvest the whole plant before quite ripe, for fear of shattering and loss of seed, and subsequent drying and threshing.

In Ceylon the Curator of the Royal Botanic Gardens at Peradeniya mentions its introduction several years before 1905 ('Tropical Agriculturist," November, 1905). He advises planting at the commencement of the wet season there, and indicates a probable value as a leguminous cover crop during the monsoons in plantations of tropical products as well as a grain and fodder crop. The seed germinated there in three to five days, the plants flowering when one month old and pods being fit to pick a fortnight later. The harvesting was complete in two months from sowing. The plants averaged 15 to 18 in. high, and the pods were three to five seeded. No mention of the amount of crop per acre is made.

The American experiments, principally in the States of North Carolina and Tennessee, but also in Virginia, Maryland, Kentucky,

Plate VI.

A Row of Soy Beans in the Nursery, Kamerunga.

Plate VII.

SOY BEAN PLANT SHOWING ROOT GROWTH.

A DOUBLE ROW OF SOY BEANS IN THE FIELD.

Illinois, and Indiana, are embodied in the reprints that have recently appeared in the "Agricultural Journal," but might be again summarised as follows:—The area in which the Soy will thrive is limited. It has a high value as grain, fodder, and green manure; returns of 20 to 30 bushels of seed and 1½ to 2 tons of straw are not uncommon. The whole plant may be harvested and threshed. Fresh seed should be used for sowing in well worked land in rows 2½ to 3 ft. apart. Good results in growth depend on the presence of the right bacteria in the soil. These do not exist everywhere, but subsequent results are often better than first trials in the same locality. Shallow planting is advised, and 1 bushel of seed quoted as enough for 2 to 3 acres. Of the varieties the smallest quoted is 2 ft. in height and the largest 6 ft. These varieties show many other distinctive characteristics also.

Also, that the Soy beans will stand quite a considerable amount of frost; are more drought resistant, and at the same time will stand excessive moisture better than many similar legumes.

In comparing the experiments in different countries the great variation of results is very noticeable.

From the Kamerunga State Nursery Experiments at Cairns, N.Q., inconclusive as they have been in some respects, a considerable amount of valuable information concerning the behaviour of this bean in this country, or rather the tropical portion of it, has nevertheless been ascertained.

THE SOY BEAN IN QUEENSLAND.

Climatic Conditions.—For successful cultivation in the Australian tropics it has been shown that this bean requires good moist soils and not too much rain after sowing. In America it is quoted as standing excessive moisture well and better than cowpeas, and the Peradeniya (Ceylon) results seem to corroborate this, but here the experience is the opposite. Our heavy tropical rains materially affected the Soy bean plants, while cowpeas alongside withstood them. The growth was found the quickest in the colder weather. In the warmer months the growth was greater but slower, and the podding and ripening also slower. Plants obtained from August sowings were the best both in growth and grain. May sowings had less leaf and tops. The effect of heavy rain was not only evidenced on the leaves and tops, but by causing the seed in the pods to mould and not mature or ripen properly. Heavy rain has exactly the same effect on the pods and seeds of the cowpeas, but the plant itself, its leaves, or runners are not affected as the Soy beans are. This would indicate that the colder and drier season of the year would probably suit the Soy bean, and July-August sowings would be safest and best.

The effect of frost on Soy beans cannot be investigated here. Baron von Müeller states that, according to Wittmack, this bean stands slight frost. The American authorities say it will stand fairly heavy frost. New South Wales publications, while stating that it gives a longer season than cowpeas, advise sowing when all fear of frost is over.

The actual range of the plant is difficult to ascertain. Jas. Hendrick, B.Sc., F.I.C., gives it as from cool temperate to sub-tropical. The experiments here have thus far shown that the drier parts of the tropics would probably suit it better. Hence, if planted about the end of the wet seasons about Mackay, towards Central Queensland, at Bowen or Mareeba in the North, or on the higher parts of the plateau behind Cairns at 1,500 to 2,000 feet above sea level, Soy beans might prove very successful.

Vitality of the Seed.—The seed received from Brisbane in September was of poor quality, though looking well. It was very dry and hard, and a proportion was bad. Probably the seed was old. It is evident that the

vitality is short, and only fresh seed should be sown if possible. In storing, the seed must be kept dry, and it is difficult to tell when it is properly dry owing to the large oil content. It was noticeable here that no self-grown seed germinated, as is generally the case with similar grains. This may possibly have been due to vermin or the excessively wet weather.

Germination.—The North Queensland germinations averaged four days, seldom less and sometimes up to nine or ten days. Soaking or similar treatment of the seed expedited germination, but involved a greater risk should hot dry weather immediately follow the sowing in the field. In sowing, well-worked soil was shown to be essential. Deep planting is detrimental, and occasionally prevented germination. The best depth was found to be 1 in. or less in moist weather; in dry weather slightly deeper. The soil must be prevented from caking once the plumule showed above ground, otherwise the seedlings pinch off easily.

Method of Sowing.—Double rows about 1 ft. apart with 3 ft. between the next double rows was found most satisfactory. For grain the plants require more room, and 4 to 5 in. apart is ample for any varieties tried here yet. For fodder they may be 2 or 3 in. apart in the rows.

Growth and Size of Plants.—The plants, if strong, continue growing from five to six weeks before forming pods, but if weakly flowered and podded within a month and while quite small. Growth continued after the first pods appeared, though the height attained only averaged 14 in., with nothing over 18 in. so far. All the pods were formed during the two or three weeks following the first flowering.

Ripening.—Hitherto the pods have not ripened together, and hence necessitated picking, and precludes any possibility of harvesting the whole plants and threshing out the seed. This possibly was due to the wet season. In dry weather or in drier localities no doubt the earlier ripening pods could be left on with safety till the latter ones were harvestable, but in a wet season either the hot sun between the showers caused shattering or mouldiness set in and the seed did not mature. Harvesting was spread over about a fortnight generally, while the average time from sowing to harvesting was seventy-five to eighty days.

Returns.—The grain returns have so far been very poor. Not enough has been grown as yet to calculate the return of dried beans per acre, but there has been nothing as yet to warrant its advocation as a grain crop under our conditions. The quality of the seed has also been poor, being wrinkled, stained, or discoloured, and often rather smaller than the original seed.

Pests, &c.—Baron von Müeller quotes Vilmorin in stating that this plant is not subject to the attacks of insects and fungus. No fungoid pests have as yet been observed, but the leaves were readily eaten by grasshoppers, caterpillars, slugs, &c. About the beginning of the year the plants are seldom seen without the leaves being finely perforated by some insect that seemingly eats off the green portion of the leaves, leaving the veins. No special insect has yet been observed actually doing this. The leaves are delicate also, as, when a weak solution of kerosene emulsion with arsenate of lead was sprayed on to them, some leaves were burnt while other delicate plants in the germinating house, done at the same time with the same solution, did not suffer at all. This spraying was done on a dry day and in the evening. The seed, which is in other places stated as not readily eaten by insects, has been attacked by weevils here.

Style of Growth.—The plants here proved fairly bushy, especially the yellow and black varieties. The black was the strongest, having a thicker stem. They were generally straight-stemmed, showing no signs

of twining. In very few instances only was any branching observed, and the bearing was confined to the main stem. In the wet weather the leaves remained green till the harvesting, but when dry and in sandy soils the leaves had dropped by the time the pods were ripe. The average number of pods to a plant was found to be twenty-one, and the maximum twenty-eight. The average number of seed in a pod was two, and in no instance was there more than three found.

Root System.—This was not very spreading, and only medium in comparison with the size of the plants. There was no indication of deep rooting, and the Soy was very inferior in spread and extent of root growth to the cowpeas.

Nitrogenous Nodules.—These have been carefully looked for, and only in one instance (the last planting) was any success met with, and then in a very limited degree only. This may, perhaps, be accounted for by the seed being new and requiring acclimatisation first, or the absence in the soil of the particular bacteria needed by the Soy beans. One point made specially evident by the experiments here was that either the particular bacteria favoured by this legume are not identical with those partial to cowpeas, Mauritius beans, Narico beans, or Mungo beans, all of which were grown in close proximity to the Soys and produced regular nodules, while the Soy beans did not, or that the existing bacteria require time to accustom themselves to a new host. That suitable bacteria do exist has been demonstrated by the discovery of a few nodules, but the value of the Soy bean in this respect cannot be judged by one trial, or for that matter by several. Hitherto only imported seed has been available, while legumes often develop these characteristics only after several generations, and sowings of our own seed (the second generation) are now being made. It is not before the third generation, however, that the best results in nodules is anticipated, finally indicating its success or otherwise as a soil-improving plant in these parts. Providing a fairly good season is experienced, if no more nitrogenous nodules are apparent by then it will have shown itself useless in one of the directions in which it might have proved of the greatest value on account of its quick growth, non-climbing habit, and the utility of its seed. Reliable information of trials in other parts of Queensland would be of great value and interest on this point.

Other Varieties.—Varieties are mentioned in the United States Department of Agriculture's publications that are not only of far larger growth and habit than any obtained here as yet, but are useful for specific purposes, and withstand excessive wet better than many. Of these "Hankow," a mottled seed, "Ricelands," a black seed, and "Mammoth," a yellow-seeded variety, would seem from the descriptions to be probably adaptable to North Queensland climatic conditions. Efforts are being made to obtain seed of these.

Finally.—While the experiments at the Kamerunga State Nursery have in some points differed from and in others agreed with experiments in other places and countries, even allowing for the season, as yet the Soy bean has not shown itself capable of sustaining the valuable attributes ascribed to it in comparison with other legumes under the climatic and soil conditions obtaining in North Queensland. The experiments are, of course, being continued, and it may yet prove to be all and more than it has been stated to be, but neither in respect to grain or fodder can its extensive culture yet be advocated, and the advice of the Department of Agriculture of New South Wales can only so far be reiterated as applying also to North Queensland—viz., that farmers and settlers should try it in a small way to see if it suits their district, soil, and climate.

CULTURAL DIRECTIONS FOR YOUNG PARA RUBBER.

By O. W. BARRETT, Superintendent of Experiment Stations, Philippine Islands.

Removal from Seed-bed.—The plants should be taken up only during the rainy season. Unless the soil has been wet with rain, the bed must be watered so that the earth will adhere more or less to the roots.

In most cases it will be necessary to cut or break some of the larger roots in removing the seedlings; if many roots are lost in this process it will be necessary to remove some or all of the leaves to prevent evaporation of the sap in the stem before new roots are formed.

The amount of balling which should be done will depend on the character of the soil, the age of the roots, the manner of packing, &c.; generally speaking, the more earth which can be taken up with the plant and packed firmly into a ball around the roots, the less the plant will suffer from the shock.

Whether transported in baskets, tins, or boxes, the seedlings must be protected from drying out and from exposure to the sun.

Seedlings having a height of 1.2 metres or more should be cut back to about 60 or 80 centimetres a few days before removing them from the nursery. The seedlings may be taken up when they have attained a height of 1 metre, and should never be allowed to reach more than 2 metres before transplanting; in special cases trees of 2 or 3 metres could be transplanted in favourable weather by cutting back to about one-half their height before transplanting. Care should be taken to prevent scratching or bruising the bark in handling the seedlings.

Planting.—Setting into the holes should be done after sunset or on rainy days.

The location of the plantation should be such that strong winds cannot damage the trees. If there are no adjacent hills or forest trees to break the force of the wind, belts of trees, such as eucalyptus, cocoanut, bonga, or mango, should be planted around and through the plantation before or at the time of setting out of the Pará trees. Rows of cacahuate (*Gliricidia maculata*) or ipil (*Lucaena glauca*) may be planted—the former by cuttings, the latter by seeds—as temporary protection, or in conjunction with other kinds, like bonga, cocoanut, and eucalyptus.

Sandy soils are dangerous on account of the quickness with which they become dry; low wet soils containing stagnant water cannot be used, though some wet lands can be drained sufficiently to become safe. Localities which regularly suffer from droughts of more than a few weeks' duration should be avoided unless adequate irrigation can be provided. Both alluvial and mountain soils are suitable provided they are always moist.

Holes.—The holes should be prepared two to four weeks before transplanting. They must be at least 1 metre in diameter; a depth of 25 to 50 centimetres is recommended. The subsoil, if poor, should be removed to a distance of at least 50 centimetres below the surface of the ground. In filling the holes only "top soil" (to a depth of 10 to 15 centimetres) about the holes may be used; care must be taken to avoid introducing grass roots or weed seeds with this earth. A few days before the Pará plants are set in, the holes may be filled nearly full to avoid delay and exposure of the seedling at the moment of transplanting.

Any broken or dead roots should be pruned off with shears or a sharp knife just before putting the plant into the hole.

The earth must be firmed in well around the roots so that there shall be no air spaces or lumps to cause trouble later. If the earth is not sufficiently moist the trees should be watered at the time of transplanting,

and, of course, as often as may be necessary *until they are well established.*

The proper distance between the holes depends upon local conditions and the plans of the planter in regard to secondary crops. If the plantation is on old cleared ground the trees may be set at 5 or 6 metres, whereas on rich or recently cleared areas 7 to 9 metres would probably prove better, especially if some secondary crop is to be grown during the first few years. There is no serious objection to setting the trees 6 metres providing the weaker trees are removed (tapped to death) as soon as they begin to interfere with the development of the vigorous individuals.

Cultivation.—At no time during the life of the Pará tree may grass of any kind be allowed to grow over the "feeding area" of the roots. The degree of cultivation given to the space between the Pará rows will depend largely upon the local conditions. As soon as convenient all brush, weeds, and grass should be eliminated. The surface of the ground, at least near the Pará trees, should be planted with beans or some kind of leguminous cover crop which will not only keep down the grass and weeds but will keep the area over the roots of the rubber comparatively cool and moist, and at the same time furnish nitrogen to the soil instead of poisoning it with root excretions, as in the case of grass.

Due precautions against fires must be taken.

No secondary crop like camotes (sweet potatoes), cassava, or bananas should be planted nearer than 2 metres from the Pará; after the third year from transplanting no secondary crop, except legumes, may be grown in the plantation.

The kinds of legumes recommended for planting as cover crops in the Philippines are: Centrosema bean; Lyon bean, yam bean, velvet bean, sword bean, and any of the native beans; cowpeas, mani manihan, peanuts, cacahuate, and ipil (*Lucaena glauca*).

The cacahuate, or baloc-balóc, is a shrub or small tree, especially recommended because it may be readily grown from cuttings stuck into the ground; it can be cut back whenever its height exceeds 1.5 or 2 metres, the removed branches helping to increase the humus layer on the ground. The habit of shedding its leaves for a few weeks in the dry season is a disadvantage in using this species: the ipil, or datels, is not deciduous.

If the soil becomes packed—*i.e.,* so wet and clogged that air and water cannot readily circulate through it—it should be forked by the vertical process, *i.e.,* by thrusting a strong-tined fork down into the ground to a depth of 10 to 15 centimetres; then, after loosening the tines, the fork is withdrawn without breaking the roots.

The young Pará trees must be protected from the depredations of pigs, deer, &c.; a woven wire fence is unquestionably the best means of protection. A very closely planted row of bonga palms (*Areca catechu*) can be utilised after about their fourth year as a live fence; bamboo strips may be woven into it and tied so that even pigs cannot force an entrance; or maguey may be planted between the bongas very effectively.

If live mulches, or cover crops, are not used about the young rubber trees some kind of straw or leaf mulch should be kept over their roots except in very rainy weather. The layer of dry grass, rice straw, or similar material should be just thick enough to prevent the growth of weeds without smothering the Pará roots; it should not touch the stem of the tree; it should be turned over occasionally.

All colonies of white ants (*Termes* spp.) in or near the plantation should be destroyed either by poisoning, fumigating, or "puddling."

All decaying wood should be removed from about the roots of the rubber.—"Philippine Agricultural Review."

A METHOD OF COTTON SELECTION THROUGHOUT THE SEASON.

The present article on this subject, continued from our April issue, furnishes the rest of the information given by the "Agricultural News," Barbados, and should be of considerable interest to cotton-growers in Queensland:—

SELECTION BY BOLL CHARACTERS.

If the farmer is engaged in the selection of a big-boll variety of upland cotton, such as the Triumph, most of the degenerate plants are very easy to recognise, because they have small bolls. This fact becomes most apparent in unselected fields about the middle of the season, soon after the earlier bolls have reached full size, but before they begin to open. A little search will show that some of the plants are producing only small bolls. Some small bolls can be found, of course, on normal large-bolled plants, just as small or defective apples can be found on a large-fruited tree. Plants that appear in a big-boll variety, but produce only small bolls, no longer represent the variety, but are to be looked upon as definite variations away from the variety. The plants that depart from the characters of the parent variety are mostly very inferior; but, even if they are not inferior, they ought to be taken out of the variety to avoid a further increase of diversity through the formation of hybrids.

The shapes, colours, and surfaces of the bolls also afford differences, of very little importance in themselves, but very useful as indicators in selection to maintain uniformity. Indeed, it is possible in a great majority of cases to judge the quality of the lint correctly in advance by looking at the bolls of a plant, after one is sufficiently familiar with the variety. Plants with shorter bolls are likely to have shorter lint, while narrower bolls indicate less abundant lint. Any pronounced difference in the shape of the bolls can be taken to indicate that the plant is a variation or a hybrid that ought to be removed, and the same is true of differences in the colour or in the character of the surface of the bolls.

Selection by boll characters is not as effective as selection by leaf and stem characters, because the inferior plants have already flowered, and there has been an opportunity for their pollen to be spread about the field. Nevertheless, if the boll selection be made early enough, much of the spreading of pollen in the latter part of the season can be avoided. An advantage of boll selection is the opportunity that it gives to become better acquainted with the leaf and stem characters of degenerate plants, and better ability to detect such plants early in the season in following years. If selection is deferred until the crop is ripe, the external differences of the plants will have become much less apparent.

SELECTION BY SEED AND LINT CHARACTERS.

More time is required for the last selection, in which attention is given to the fertility of the plants and to the characters of the lint and seed. The labour will have been greatly lessened by the previous roguing out of all the plants that gave external evidence of tendencies to depart from the uniform type of the variety, either in the habits of growth, in the characters of the leaves, or in the size and shape of the bolls. Plants that show themselves deficient in fertility, or in earliness, in comparison with their neighbours, can also be omitted from the last selection. The examination of the lint is thus narrowed down to the plants that have appeared satisfactory in all other respects. Many

planters have made a practice of noticing differences in lint, and are already well qualified to perform this kind of selection.

The length and abundance of the lint are compared in the field by the familiar process of straightening it out from the sides of the seed, either by pulling between the thumb and finger or by using a small comb. One or more samples of the combed-out lint from different plants can be held between the fingers of the left hand and thus carried along for ready comparison. The strength of the lint is judged in the field by breaking the combed-out strands while held between the thumbs and first fingers of the two hands. Any plant is rejected that shows itself inferior to its neighbours in length, strength, or abundance.

USE OF PROGENY ROWS IN SELECTION.

Selection of a high-grade variety of cotton can be somewhat simplified and also rendered more effective if the farmer is willing to take the additional precaution of saving the seed of each selected plant separately, in order to plant a part of it in a separate row the following season.

The use of the progeny rows* enables an additional precaution to be taken to guard the purity of a good stock by holding over a part of the seed from which each of the progeny rows has been planted. If any of the rows should prove to be of exceptional merit, it is possible to go back to the reserved seed of the parent of the best row, and sow it in a separate, isolated plot, in the next season, as the foundation of a special strain, descended from a single superior plant.

Planters of Sea Island cotton are accustomed to the plan of narrowing their selection down to a single superior plant. They multiply the seed from this plant for two or three years in separate seed plots, to secure enough for field planting. The very high quality and unusual uniformity of the Sea Island cotton are to be ascribed largely to the method of selection that has been followed.

CONCLUSIONS.

The full possibilities of improving the cotton crop cannot be realised until the work of selection is carried out on every farm, and becomes established as a regular part of the care of the crop. The only adequate alternative is the purchase of selected seed from a careful neighbour, who maintains his selection and produces a uniform crop.

One of the most important advantages of the plan of raising cotton for seed in a separate field or plot is that the farmer is likely to give the plants more attention, and thus become more familiar with the characteristics of the variety that the plants represent. Such familiarity is necessary in order to qualify the farmer or the breeder to establish and maintain the uniformity of the variety by selection.

Though much of the undesirable diversity of the crop can be ascribed to the mixture of varieties, it is not possible to keep any variety uniform without continued selection. Spontaneous changes to inferior characters occur even in the most uniform varieties; and if such variations are not removed, the uniformity of the stock is gradually destroyed.

A farmer who knows his variety well enough can make use of the external characters for the removal of inferior plants early in the season, when this work can be done more easily and efficiently than by waiting for the lint and seed characters at the end of the season.

Attention to the external characters makes it possible to detect degenerate plants—those that will produce small bolls and inferior lint,

* See "Q.A. Journal" for April, 1911.

even before they have begun to flower. The roguing out of such plants early in the season guards the uniformity of the crop by preventing the cross-fertilisation of good plants with pollen of inferior individuals.

The cotton plant is extremely susceptible to influences of soil and climate. Each variety shows a wide range of differences under different conditions, and the proportion of degenerate plants—those that make definite changes away from the characters of the variety—is also influenced by the conditions under which the plants grow.

The popular idea that persistent selection will bring about a continued improvement in a pure-bred variety is now questioned in the scientific world, but this does not affect the agricultural importance of selection as a means of preserving the uniformity and productiveness of varieties.

FUTURE OF THE AUSTRALIAN SUGAR INDUSTRY.

(From the "Australian Sugar Journal.")

Readers who have studied our digest of the report of the Central Sugar Mills Commission, appearing in the April issue of "The Australian Sugar Journal," must have noticed one outstanding fact governing the whole sugar position in this country. Under present conditions, sugar production in Australia is limited by the possibilities of sugar consumption in our own country, for the simple reason that export is impossible in face of competition with black-grown cane, and cheap-labour beet sugar. The Commissioners were only able to recommend additional advances for central mills after finding that our average net imports during the past ten years have worked out at something over 46,000 tons per annum. This is by no means a big margin, and a practical man like our present Premier, the Hon. D. F. Denham, could not fail in his recent visit to the North to be impressed with the enormous difference between the large areas of land awaiting occupation, and the comparatively minute opportunities for expansion, so far as the sugar industry is concerned. What makes the problem more acute is that, as emphasised by the Commission in their report, sugar, and perhaps bananas, constitute, to all intents and purposes the only visible opening for agriculture in these parts.

Mr. Denham had facts staring him in the face day after day, as he travelled through the fertile alluvial lands of the North Queensland coast, and listened to the information freely supplied to him by experienced men. Naturally, he cast around for a way out—some means by which expansion could be made possible; and we think it will be admitted that, whatever differences of opinion may exist, the suggestion he has made ought not to be hastily set aside. It is briefly this: The Commonwealth levies in excise every year a sum largely in excess of that which it repays to the industry under the quite misleading name of bounty, but which we prefer to describe by the more accurate term of "rebate." This sum, which may be estimated at not far short of a quarter of a million sterling annually, might, Mr. Denham thinks, be justly used to create a special fund, from which could be paid a special bonus on all such sugars grown in this country, as would require to be exported. This, Mr. Denham points out, could be worked in conjunction with a bookkeeping scheme in which the whole sugar production of the country would be pooled, and whatever loss accrued would be equally distributed over the whole. Here is a problem demanding the attention of the Federal Parliament on broad statesmanlike lines; here is just one of those matters for

which the federation was at first designed. Australia needs to speak and act as a whole in such a matter. Queensland is interested, no doubt; but so also is New South Wales, and the whole northern section of this great continent, including all the rich river lands of tropical West Australia, and of what is known as the Northern Territory. These must be populated and utilised, and until some form of tropical agriculture can be established, the progress of those divisions will indeed be slow. Mr. Denham has certainly shown insight in recognising the need for expanding our tropical industries. It is to be hoped he may be able to impart it to others, so that Federal as well as State members and Ministers may unite in working for the day when the coast districts of this State, as well as other tropical areas, shall be large exporters of sugar, and it may also be bananas and similar products, together with dairy products from the table-lands beyond. "These," says Mr. Denham, "together with a vast mineral output, mean giant strides in the North during the next few decades." May the vision indeed be realised.

We do not forget that the Treasurer of Australia has obtained a very substantial addition to his revenue during the past ten years from this very source, the aggregate excise exceeding the rebate to cane-growers by upwards of two millions sterling. But members on both sides of the House, including the Prime Minister and some of his principal colleagues, have admitted the injustice thus done the sugar-grower, who is placed in a different position from those interested in any other protected industry. Doubtless, the Treasurer can dispose of all the money that may be collected by any means whatsoever; but he cannot any longer plead poverty as a reason for this enforced levy from the sugar industry, seeing that he is in a position to lend to the State Treasurers.

The mere advocacy of such a proposal is one step towards a due recognition of the truth concerning excise and rebate. At the same time it involves no undue concession to the industry, seeing that the money to be used in encouraging an export trade would be entirely contributed by the industry itself. Indeed, so far as the financial side of the proposal is concerned it is practically a compliance with the request of the Australian Sugar Producers' Association when the recent legislation was before Parliament, that the amount of the rebate should be made equal to that of the excise, thus removing the injustice so keenly felt by cane-growers, and all interested in sugar production.

Some of our critics will be disposed to ask what about the poor consumer? But we would point out that there is nothing in the proposal which can at all affect the price of sugar to him. Happily for Australia we are now in such rapid and cheap communication with the rest of the world that prices for all our principal articles of food are regulated, not so much by local supply and demand as by the prices in other parts of the world. For instance, butter, though so largely produced in Australia, is dearer to the consumer to-day because of the demand that exists in London in anticipation of the great influx of people for the coronation festival in June. The Australian miller, again, has to fix his prices for flour according to the rates ruling on Mark Lane. A demand for higher rates in any of these products than are justified by outside quotations would quickly lead to importation—and a slump. So also is it with sugar, with the difference that our price has to be kept below European rates plus duty, freight, and charges. Thus, the consumer is amply protected. As was pointed out by the Commission, the sugar industry of Queensland is seriously menaced by the importation of foreign-grown sugars, which are sold at a price lower than that obtainable for Australian sugar. The complaint voiced by the Hon. Angus Gibson during

the recent Maryborough Conference of the A.S.P.A., is borne out by the remarks of the Commission, to the effect that they had ascertained that " in the year 1910, approximately 10,000 tons of these (foreign-grown) sugars were imported and sold in competition with Australian sugars." This is proof positive that the rate of protection now given to our sugar is by no means too high.

Doubtless there are many economic considerations in connection with such a proposal as that put forward by Mr. Denham, and these will demand close investigation. At the same time we sincerely hope the matter may receive wise and discriminating treatment at the hands of Commonwealth Ministers and Parliament. In conclusion, we desire to congratulate sugar producers generally on the advantages accruing to the industry from the visit of the Premier, who would scarcely have given such close attention to this matter had he not been brought into personal contact with the industry and those engaged in it. A further ground for satisfaction is the determination of the Minister for Agriculture to visit the North on his own account. Mr. Tolmie, at the meeting of Moreton Mill shareholders at Nambour a few months ago, expressed his desire to make fuller acquaintance with the sugar industry.

During May last Mr. Tolmie completed an extensive tour through the sugar district.

ENORMOUS YIELD FROM A RUBBER TREE.

The "Times of Ceylon," in recording an interview with Mr. H. A. Wickham, the well-known pioneer rubber planter of Papua, mentions that he was shown the biggest of the original rubber trees in the Heneratgoda Botanic Garden. Mr. Wickham had not seen these trees for thirty-four years. Planted in poor soil, the big tree has been allowed to gather energy for a generation—almost untouched—until two years ago, and when tapped during 1909-1910 it yielded the almost unthinkable quantity of 160 lb. of dry rubber. This yield of 80 lb. of rubber per annum is certified to by the Botanic Garden authorities. "What greater confirmation of the theory, emphasised by the veteran pioneer in the interview," says the "Times," "that animals and plants taken out of their natural habitat, often thrive exceedingly?"

THE TRADE OF IRELAND IN LIVE STOCK.

To the Australian who has not studied the live stock business in other countries, it must appear incredible that a small country like Ireland should possess such unique facilities for the breeding of stock. Store and fat cattle, sheep and pigs (says the " Live Stock Journal"), come to England from Ireland in very large numbers. A few figures will at once make clearly manifest the importance of the subject. Thus, last year, there were imported from Ireland to Great Britain 868,984 cattle, 731,702 sheep, 324,070 pigs, and 31,896 horses. These statistics by themselves afford striking testimony of the extent of the trade; and, if values were also computed, adding also the sums representing butter, hams, pork, and bacon, not to speak of corn and other products, it would amount to a very large total.

Chemistry.

THE SOILS OF THE UPPER BURNETT.—II.

By J. C. BRÜNNICH, AND G. R. PATTEN.

The analyses of the soils of the Upper Burnett district, which were published in the November number of the "Queensland Agricultural Journal," drew attention to the exceptional fertility of the district, and therefore further samples which were collected and submitted by Dr. Th. L. Bancroft are of particular interest, as they confirm the previous analyses, showing distinctly that the Upper Burnett should be one of the richest and most fertile agricultural districts not only of Queensland but of the Commonwealth.

The first four samples, Nos. 1265 to 1268, were obtained in the parish of Hollywell, about 6 miles east-north-east from Eidsvold township, to the east of a 400-acre selection, 1v. From these analyses of the soils, which are given on Table II., it will be seen these four soils, representing both forest and scrub lands, are exceedingly fertile, as they contain large amounts of total plant foods and of available plant foods. As most important plant foods we consider chiefly the humus, nitrogen, phosphoric acid, potash, and lime. The total amounts of these chemical compounds are very high, and considerably above the average of the general run of our soils, and they should therefore prove very lasting, if a judicious rotation of crops is practised.

In order to aid our farmers in the interpretation of chemical soil analysis, I give herewith a table, from which the fertility of a soil may be judged from the chemical composition (Table I.) :—

Table I.—Valuation of Soil Fertility from Chemical Analysis.

—	Humus.	Total Nitrogen.	Total Elements in the Soil (Soluble in Hydrochloric Acid Sp. Gr. 1·115). Phosphoric Acid.	Lime.	Potash.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Very low	Below 1·5	Below ·05	Below ·05	Below ·10	Below ·05
Low ...	From 1·5 to 2·49	From ·05 to ·09	From ·05 to ·09	From ·10 to ·24	From ·05 to ·09
Fair ...	„ 2·5 „ 3·49	„ ·10 „ ·14	„ ·10 „ ·14	„ ·25 „ ·49	„ ·10 „ ·19
Very fair	„ 3·5 „ 3·90	„ ·15 „ ·24	„ ·15 „ ·24	„ ·50 „ ·74	„ ·20 „ ·39
Good ...	„ 4·0 „ 5·90	„ ·25 „ ·49	„ ·25 „ ·49	„ ·75 „ 1·49	„ ·40 „ ·74
Very good	6·0 and over	·50 and over	·50 and over	1·50 and over	·75 and over

—	Available Plant Food (Soluble in 1°/₀ Citric Acid).		
	Per cent.	Per cent.	Per cent.
Low	Below ·01	Below ·10	Below ·005
Fair	From ·01 to ·014	From ·10 to ·24	From ·005 to ·009
Good	„ ·015 to ·024	„ ·25 to ·39	„ ·010 to ·019
Very good	·025 and over	·40 and over	·020 and over

It must be distinctly understood that this table may not be used indiscriminately, without taking other factors into consideration. A soil, for instance, with .4 per cent. of potash is considered good in this plant food, but in a light sandy loam even a lesser amount may be good, whereas in a very heavy clayey soil this amount would be just fair. Again, an amount of plant food fair for a certain crop may not be sufficient for other crops. As available plant foods we record that portion which is soluble in dilute organic acid, and which therefore may be considered to be readily absorbed by the plant roots.

A closer study of the present analyses shows that the difference between the forest and scrub soils is chiefly in the amounts of humus and nitrogen they contain. The forest soil contains 2.35 per cent. of humus which is classed as low, but as a matter of fact is quite a fair amount for this class of sandy loam. The amount of humus in the scrub soil is considerably higher, and, as the humus plays an important part in the preservation of the soil-moisture, it will be understood that the scrub soils will not dry out so rapidly during dry spells. The subsoil of the forest land appears to be a rather stiff clay, and this soil would therefore be not suitable for fruit culture. The subsoil of the scrub land is of a more crumbly nature, and fruit trees ought to do well. The chief use of such high-class soils is, however, the culture of lucerne, maize, potatoes, vegetables, &c. All fodders grown on that land would be highly nutritious and rich in mineral matters, chiefly lime and phosphoric acid, and therefore this country would be of great value for dairying and stock-raising. The degeneration of good stock, due to want of lime, so often noticeable on some of our coastal districts, would be quite out of question in the Upper Burnett. For comparison with these rich soils the analyses of soils of a light sandy nature, obtained from a small plateau south of Eidsvold, not far from the Cemetery Reserve, are given. This plateau would be well suited for the culture of citrus fruits. For the growth of vegetables and market crops the use of artificial manures would be required, and even for fruit trees artificial manures will be found of benefit as soon as trees commence to bear.

In order to make the analyses more intelligible, the actual amounts of plant foods, both total and available, are calculated in pounds per acre contained in the soil to a depth of 12 in. We find in the bottle-tree scrub soil 40,600 lb. of potash per acre, of which 980 lb. are available; whereas the sandy soil of the plateau has only from 1,190 to 1,365 lb. of total potash, of which 59 to 276 lb. are available. The difference in this composition is easily accounted for in the geological origin of these soils. The plateau soils are on an outcrop of desert sandstone surrounded by granitic formation, whereas the other soils belong to the Gympie formation prevalent throughout the Upper Burnett district.

Table II.—Analyses of Soils from Parish of Hollywell.

About Six Miles E.N.E. from Eidsvold Township.

Laboratory Number	1265.		1266.		1267.		1268.		1500.		1501.	
Locality	Forest Soil		Bottle Tree Scrub, level land		Bottle Tree Scrub, ridge and high ground		Brigalow Scrub ...		Plateau, south of Eidsvold, not far from the cemetery.			
Soil	Brown sandy loam		Brown sandy loam		Brown sandy loam		Brown sandy loam		Red sandy loam ...		Chocolate sandy loam	
Subsoil	Stiff brown clay ...		Brown clayey subsoil		Subsoil, mostly rotten rock		Light clayey subsoil		...		...	
Reaction	Neutral		Faintly acid ...		Faintly acid ...		Faintly acid ...		Strongly acid ...		Neutral	
Chemical Analyses of Soil.	Per cent.		Per cent.		Per cent.		Per cent.		Per cent.		Per cent.	
Moisture	2·08		2·86		4·12		4·02		·58		·72	
Humus	2 35 (low)		3·70 (v. fair)		4·60 (good)		5·20 (good)		3·39 (fair)		2·54 (fair)	
Other Organic Matter and Combined Water	5·03		5·42		9·12		7·52		·23		1·10	
Chlorine	·005		·005		·005		·003		·008		·006	
Nitrogen	·135 (fair)		·295 (good)		·422 (good)		·365 (good)		·031 (v. low)		·065 (low)	
	Hydro-chloric Acid Extract—Total Elements.	Citric Acid Extract—Available Plant Food.	Hydro-chloric Acid Extract—Total Elements.	Citric Acid Extract—Available Plant Food.	Hydro-chloric Acid Extract—Total Elements.	Citric Acid Extract—Available Plant Food.	Hydro-chloric Acid Extract—Total Elements.	Citric Acid Extract—Available Plant Food.	Hydro-chloric Acid Extract—Total Elements.	Citric Acid Extract—Available Plant Food.	Hydro-chloric Acid Extract—Total Elements.	Citric Acid Extract—Available Plant Food.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Phosphoric Acid	·312 (good)	·0317 (v. good)	·350 (good)	·0419 (v. good)	·414 (good)	·0398 (v. good)	·248 (v. fair)	·0301 (v. good)	·105 (fair)	·0097 (low)	·121 (fair)	·0046 (low)
Lime	·990 (good)	·3028 (good)	·825 (good)	·2180 (fair)	3·560 (v. good)	·5164 (v. good)	·890 (good)	·3402 (good)	·085 (v. low)	·0110 (low)	·120 (low)	·0890 (low)
Magnesia	1·142	...	1 250	...	1·883	...	·547	..	·158	...	·182	...
Potash	·556 (good)	·0114 (good)	1·160 (v. good)	·0280 (v. good)	·450 (good)	·0071 (fair)	·820 (v. good)	·0153 (good)	·039 (v. low)	·0017 (low)	·034 (v. low)	·0079 (fair)
Insoluble in Hydrochloric Acid	76·06	...	68·13	...	55·95	...	66·24	...	81·99	...	87·55	...
Lb. per acre of plant food to 12 in. depth.	Total Elements.	Available Plant Food.	Total Elements.	Available Plant Food.	Total Elements.	Available Plant Food.	Total Elements.	Available Plant Food.	Total Elements.	Available Plant Food.	Total Elements.	Available Plant Food.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Phosphoric Acid	10,920	1,109	12,250	1,466	14,490	1,393	8,680	1,053	3,675	339	4,235	161
Lime	34,650	10,598	28,875	7,630	124,600	18,074	31,150	11,907	2,975	385	4,200	3,115
Potash	19,460	399	40,600	980	15,750	248	28,700	535	1,365	59	1,190	276
Nitrogen	4,725	...	10,325	...	14,770	...	12,775	...	1,085	...	2,275	...

Science.

AN EXPERIMENT IN SOIL TREATMENT FOR NEMATODES.

By C. E WOOD, Overseer, Kamerunga State Nursery.

A plot of land at this nursery, consisting of dark-coloured and very sandy loam, being found to be badly infested with nematode worms, an experiment was undertaken with a view to seeing whether the same land could be satisfactorily cropped after manurial treatment. The block had been previously cropped with tobacco and cowpeas, both of which were failures owing to the nematodes, the extent of the depredations of which may be gauged from illustration "A," which was a fair sample of a root of a cowpea from untreated soil in this plot. A few odd tomatoes, wild and cultivated, that sprang up spontaneously in this land, were also watched and found to be, if anything, worse than other plants; even some common weeds were affected.

The land in question had been abandoned for many years and had recently grown very little other than burrs (*Urena lobata,* and *Triumfetta pilosa*), which, however, did not seem to be affected by the nematodes. No legumes were noticed in the plot previous to it being broken up and brought under cultivation.

The first crop grown on it was fairly good; the second not so good, the reason of which was not then suspected. But the third crop, as above stated, was an entire failure due to its roots being very badly affected by these nematodes.

There is no reason to suppose that the nematodes were introduced there, and it may be reasonably concluded that they existed there prior to the land being cultivated; also it seemed evident that they increased rapidly with the cultivation and working of the soil, culminating by the third season in an amount sufficient to render the cultivation of any crop subject to their attack quite hopeless.

It had already been proved that these nematodes existed in leaf mould and any organic manurial matter formed, or found, on the land; and also that they could be destroyed by sterilization, which was done on a small scale by heating some soil on sheets of iron over a fire. In making tobacco seed beds the well burning of the soil either did away with them entirely or to a great extent, admitting of satisfactory germination of seed; but it was also found that such beds became reinfested, probably from the surrounding soil, within a few weeks to two months.

Of course sterilization was not possible on a large scale or in dealing with the whole field. Affected roots from the third crop on this field (which is after this called the original crop because by it was determined the presence beyond doubt of the nematodes) were destroyed by being burnt, and not left to breed more nematodes.

The experiments were made principally with cowpeas that were known to be readily susceptible to nematodes, and in beds made up in parts of the plot also known to be badly infested. The beds were, roughly, 100 square feet each, and were treated as follows:—

A—Untreated.

B—Lime	1¼ lb.	to 100 square feet.
Meatworks manure ..	¾ lb.	" "
Sulphate of ammonia ..	2 oz.	" "
Sulphate of potash ..	2 oz.	" "

Plate VIII

Fig. A.

Fig. B.

C—Lime	1	lb.	to 100 square feet.
Meatworks manure ..	¾	lb.	,, ,,
Sulphate of potash ..	¼	lb.	,, ,,
D—Vapourite	1¼	lb.	,, ,,
Meatworks manure ..	1	lb.	,, ,,

The per acre rates and cost of the manure of these worked out as follows:—

	£	s.	d.
B—Lime, 550 lb. per acre, value at 7s. per cwt.	1	15	0
Meatworks manure, 330 lb. per acre, value at 7s. per cwt.	1	1	0
Sulphate of ammonia, 55 lb. per acre, value at 16s. 6d. per cwt.	0	8	0
Sulphate of potash, 55 lb. per acre, value at 14s. 6d. per cwt.	0	7	3
Cost per acre of treatment	£3	11	6
C—Lime, 440 lb. per acre, value at 7s. per cwt.	1	8	0
Meatworks manure, 330 lb. per acre, value at 7s. per cwt.	1	1	0
Sulphate of potash, 110 lb. per acre, value at 14s. 6d. per cwt.	0	14	6
Cost per acre of treatment	£3	3	6
D—Vapourite, 550 lb. per acre, value at 8s. per cwt. ..	4	10	0
Meatworks manure, 440 lb. per acre, value at 7s. per cwt.	1	8	0
Cost of treatment per acre	£5	18	0

Cost of applying the manure or working—*i.e.*, labour—has not been included.

The cowpeas sown were of different varieties, and, while it was desired that they might if possible ripen seed, it was necessary that they should be taken up at the same time for photographing; and therefore the sowings were made at different times to, as far as possible, admit of their maturing.

The beds were planted and harvested as follows:—

Bed A—Sown, 4th April. Dug up, 8th July. Time growing, 95 days.

Bed B—Sown, 14th March. Dug up, 8th July. Time growing, 116 days.

Bed C—Sown, 5th February. Dug up, 8th July. Time growing, 153 days.

Bed D—Sown, 1st April. Dug up, 8th July. Time growing, 99 days.

The plants in the treated beds all showed excellent growth of green stuff, and all podded well, though "D" had not fully matured all its seed.

The results are clearly shown in the accompanying photographs of average roots taken from each bed.

With regard to amount of crop and absence of nematodes, the experiment "D" gave the best results; but, as will be seen by the cost of material, Vapourite at the rate applied would be prohibitive. With

regard to crop alone, experiment "C" gave the best results, though it was not quite so free from nematodes as "D." Taking into consideration the cost of the manures, &c., and the fact that the plants in this experiment were the only ones that showed any nitrogenous nodules on their roots, "C" was on the whole the best. "B" was satisfactory, but more expensive than "C," and the root growth was not so extensive or strong.

The experiment also shows fairly clearly that judicious treatment with manures makes a great deal of difference in results of cultivation in nematode-infested soils, and that a good and paying crop may be obtained in spite of nematodes by the use of artificial manures.

It has not yet been possible to carry on the experiment to see the effect of nematodes on plants in the same spots without further treatment, or with similar manuring, but there would seem no doubt that a distinct improvement would be evident in beds so treated the next season, even though the nematodes were not entirely absent.

The same beds will now be dug over and cowpeas again sown, but no further dressing of artificial manures or lime will be applied.

As this is only a first experiment the results as depicted in the illustrations, though they are photographs of the actual plants, may be to some extent misleading until corroborated or confirmed, and subsequent experiments may give different results.

With vegetables it was found that by germinating the seed in boxes of soil sterilized as described earlier, carefully selecting strong and healthy plants, and forcing them by good manuring from the moment the seedlings were planted out, very fair table vegetables could be obtained before the nematodes did much harm to them. But that slow growth is fatal, bing in nearly every instance badly attacked before the vegetables (particularly roots) were of sufficient size to be made use of.

Whether there are several different species of nematodes or not it has not been possible to find out, but if it is only one species it has apparently a very wide range in plants that it will attack. The illustrations will show it as affecting tobacco, tomatoes, vegetables (beets, that had been slow in growing and a comparatively long time in the ground), and leeks, as well as cowpeas, &c. These are all from the same plot and under conditions similar to those of the original crop. The leeks are very distinctly affected, and I believe Mr. Tryon, the Government Vegetable Pathologist, &c., has stated that he has only occasionally (twice or more previously) personally met with these nematodes on the Onion family of plants; and this may, therefore, be interesting as showing the virulence of these pests in the plot.

SWAMP CANCER.

Treatment of swamp cancer depends largely on the part affected. Where practicable, burn the growth off with a hot iron, taking care not to burn the adjoining good flesh more than necessary. After burning off the bulk of growth, find out if there are any small channels or openings; if so, burn the inside of these by means of a small round iron (somewhat like the shape of a lead pencil). Treat the wound daily with corrosive sublimate 1 part, glycerine 10 parts, water 1,000 parts, well mixed together.

This disease is undoubtedly caused by an organism the exact nature of which has not, up to the present time, been too clearly demonstrated. It is not looked upon as a malignant growth similar to those commonly known as cancer.

Plate IX.

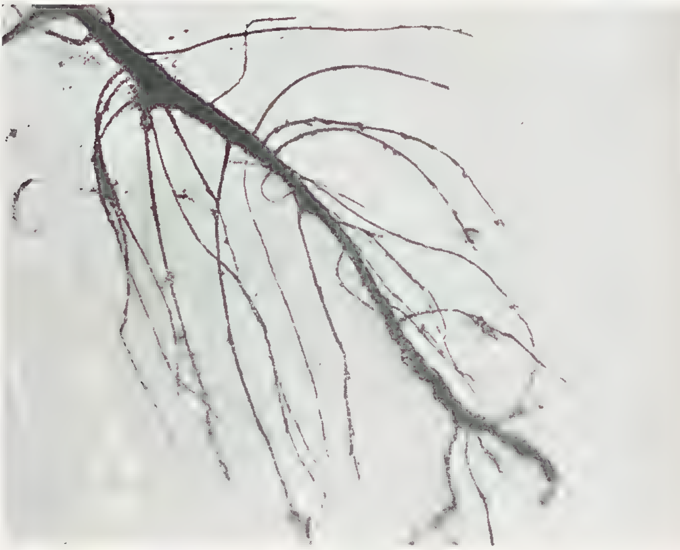


Fig. C.

Fig. D.

Plate X.

Nematodes on Tomatoes.

Nematodes on Tobacco.

Plate XI.

Nematodes on Leeks.

Nematodes on Slow Grown Beets.

Plate XII

DWARF GIANT TOMATO.

General Notes.

TOMATO (DWARF GIANT).

The plant grows from 2 ft. to 2 ft. 6 in. in height. It is a very good bearer, as the fruit grows in large bunches. The plant does not spread much, and has large leaves, and will stand dry weather pretty well. It is a good firm tomato and a good packer.

THE BAMBARRA GROUND NUT.

We regret that, by an oversight, the article on "The Bambarra Ground Nut," which appeared in our issue of February, 1911, was not acknowledged as having been taken from the "Agricultural News" of Barbados. A note on "Rates of Growth of Rubber Trees" and "Yield of Latex from Young Ceara Rubber Trees" were inadvertently credited to "Tropical Life," London, instead of to the "Agricultural News," in July, 1910.

NEW VARIETY OF DUCK.

A duck-breeder in Sydney, Mr. G. E. O. Craft, of Ingleburn, has, after working for several years at the evolution of a new breed of ducks, been successful in bringing out a new variety, to which he has given the name of "Royal Sky." They are now so well established that they are confidently offered to the public as an entirely new breed. In colour they are blue-grey, and are about the size of the Buff Orpington duck, and, like the latter, are stated to be an excellent all-round breed, both for laying and table purposes. At the Royal Society's exhibition Mr. Craft exhibited a duck and a drake, taking first prize with the duck and second prize with the drake.

Answers to Correspondents.

HORSES ON "GRITTY" COUNTRY.

H. D., N.C. Line—

Question.—Would horses that have been on "gritty" country appear older than they actually are?

Answer.—To this, Mr. A. H. Cory, veterinary surgeon, Department of Agriculture and Stock, replies: "Most decidedly. The nature of the country affects the horse's teeth. In this case, it is quite possible the horse marks two years older than he really is—provided he is six years old, or upwards.

CROWN-GRAFTING THE MANGO.

YOUNG ORCHARDIST, Maryborough—

Crown-grafting the mango is a popular system with those who make a study of grafting fruit trees. For this purpose, the stock may be of any age. Smooth-bark trees with tough, pliable bark are the best for successful grafting. The head of the stock is first sawn off. Then the knife is applied about 6 in. from the top of the remaining stump, the point pressed through the bark, and drawn upwards, cutting a straight line completely through the bark with the least possible injury to the subjacent tissue. At the top, the bark is raised gently from the wood with the point of the knife, and a smooth bone (say, the handle of a tooth brush with a sharp point) is inserted between the wood and the bark and pressed downwards; this raises the bark, and the scion is placed in the aperture and gently pressed downward, its lower end having previously been cut for a space of 4 to 6 in. in the form of a long wedge, having the inner face plane or hollowed in the centre, and the outer face slightly rounded, so that the cambium of both stock and scion may be in contact as much as possible. The bark at the edges of the long, wedge-shaped cut on the scion should be retained, and, in pressing the scion into its place, the greatest care should be exercised to prevent those two strips of bark from being pushed off, and the cambium layer of the scion destroyed.

By an expert operator, more than one scion may be inserted, but the work must all be quickly done, and the wound bandaged thoroughly and covered with clay or grafting-wax to keep out air and water, then closed up and covered with an inverted flower pot grass-covered to keep it cool. After a few weeks leaves will shoot from the scion, and the graft may be gradually inured to the open air by removing the shade in the afternoon and replacing it next morning. It is best for a beginner to cut the head off the stock, about 3 ft. from the ground; then if the first attempt is a failure, 6 in. more may be cut off, and so on, until practice has induced skill enough to produce satisfactory work. This is the method as described by G. Marshall Woodrow, F.R.H.S., formerly Professor of Botany, College of Science, Poona, India, in his pamphlet on "Mango Culture." The illustration shows a stock grafted by Mr. Horace Knight, Queensland. You may, however, adopt successfully a method discovered by Mr. Knight, and which was also independently discovered by Mr. W. G. Oliver, in Florida. Mr. Oliver described the process of "shield budding" the mango as follows:—

"The method I wish to call attention to must be performed under certain conditions, the first and most important of which is that the

Plate XIII.

Grafted Mango Tree.

Plate XIV.

GRAFTED MANGO TREES.

stock must be in active growth. The best time is when the leaves are not far enough developed to show the bright green colour. The bark is then most easily removed. Choose the thick part of the stem only a few inches above the surface of the ground; cut out a rectangular piece of bark about 1½ in. in length, and from the variety to be propagated cut a similar piece with a bud in the centre, not, however, from new wood, but from that which is at least two years old, and which has lost its green colour, and assumed the greyish-brown tint. Fit the section of bark with bud attached into the space formed by the removal of the bark from the stock. If the latter piece of bark has a bud in the central part, the wood exposed to view will fit better with the section of bark to be applied. When the section has been put in place, with a small brush apply a light coating of liquid grafting-wax, in which there is a large quantity of resin, to the cut parts, and immediately tie firmly with thick pieces of raffia; then an 8-in. wide strip of strong wrapping paper wound round and round the stem, a few inches above the bud, and tied above with a cord. This completes the operation for the time being.

"If good material is selected and the operation carefully carried out at the proper time, there is no reason why a high percentage of successful unions should not be secured."

Grafting-wax is made by melting together equal parts by weight of resin, beeswax, lard, and turpentine over a slow fire, stirring thoroughly. In the absence of grafting-wax, a paraffin candle melted and applied with a brush will be found a useful substitute.

CANDIED PEEL.

"HOUSEWIFE," Toogoolawah—

Cut your fruit in halves or quarters, and take out the pulp. Soak the peel in salt and water until the bitterness is drawn out, then in fresh water for some hours to take out the excess of salt. Then boil gently until the peel is quite tender. This is the preparatory work. It now remains to replace the water in the peel with sugar, and this is done by boiling several times in syrup. For the first boiling make the syrup fairly weak, using white crystal sugar—say, 2 lb. to the gallon. Take out the peel and let it drain, and add sugar to double the strength of the syrup, and boil gently again. Repeat the operation, making the syrup strong. Take out the peel and place cup, side up, on a board or wire to drain and dry, partly filling the cup with strong syrup, which when dry will form a cake of sugar.

POSTHOLE DIGGER.

Mr. Alex. Brown, Barney View, Upper Logan, would be glad if farmers who use a posthole digger would give him the benefit of their experience, through the medium of this Journal.

PEANUTS—PAPAWS.

"ISLANDHOLME," Upper Fitzroy—

There is a good market for Giant Peanuts in the South. Peanuts are quoted in the Sydney market at 5½d. per lb. If the Papaw-trees are bearing very heavily, you should thin them out when they are small, leaving sufficient room for the remainder to increase in size without being squeezed by others. Remove also the flower buds which form above the cluster of fruit.

Publication Received.

"The Cultivation of Hevea; A Manual for the Planter," is the title of a most useful book, one invaluable to the rubber planter, by Dr. P. J. S. Cramer, Director of Agriculture in Surinam. The original, in Dutch, has been faithfully translated by Messrs. Stuart R. Cope and A. Content. Dr. Cramer was commissioned by the Dutch Government of Surinam (Dutch Guiana) to visit the rubber plantations in Java, the Malay Peninsula, and Ceylon to investigate the methods of cultivation and preparation of rubber as adopted in those countries. He accordingly visited over twenty estates in the Federated Malay States and Straits Settlements, numerous estates in the neighbourhood of Kandy and other districts in Ceylon, and the outcome has been the publication of a work which is not primarily intended as a study of the cultivation of hevea in the Straits Settlements in general, but only as a manual for the planter.

Hevea planting is now proceeding so rapidly in tropical countries and so many capitalists are engaging in the business, many with only a superficial knowledge of the business, that such a work as that under review may be said to be an actual necessity particularly for managers of new estates where experience has been mainly gained in one country only. One great merit of the book is, that it avoids masses of statistics which often tend more to confuse than to enlighten the student. The language of the translation is simple and clear, and conveys accurately the text of the original.

The opening chapters deal with the preparatory arrangements, such as clearing the land, with descriptions of the various kinds of soil suitable for hevea cultivation, the note on Lalang soils being especially interesting. A chapter on drainage as a protection against wash is followed by the important matter of choice of seeds, deals with seeds and nurseries, and gives directions for the preparation of "stumps."

Clear instructions are given as to methods of planting and upkeep of the plantations. A very important matter in rubber-planting is the cost of weeding, especially on Lalang country. This question is well dealt with in a short chapter, showing the advantages and disadvantages of such weed-destroyers as *Passiflora fœtida, Mimosa pudica,* and "Kralok" (*Phaseolus Lunatus*). Catch crops are also described, and the best methods of planting them. Not the least important section of this useful publication are those devoted to lopping, pruning, and tapping, the latter process, on which depend so vitally the well-being of the trees and their duration of life, being so exhaustively treated as to leave practically no question on the subject unanswered. The diseases to which hevea trees are liable are especially root-fungus (*Fomes semitostus*), white ants, rats, and in a less important degree the stem disease known as "Djamoer Oepas." Finally the planter is presented with valuable instruction in the matter of collection of the latex, the labour force required, and the concluding operation of preparing the various classes of rubber, under the heads of "Sheet," "Crêpe," and inferior qualities, such as "Scrap." Packing in Venesta chests is recommended. These chests are patent cases, the sides of which consist of three-ply wood, the grain of each ply crossing the other, and perfectly smooth, which is a

most important consideration for rubber packages, because, if the sides are rough or dirty or sawdust is present, these stick to the rubber and decrease the price enormously; and, for the same reason, paper linings are not to be used. Taking the work as a whole, it consists of 132 pages, well illustrated, of information and instruction of the utmost value to planters, especially to those newly entering upon the industry. It should be in the hands of every rubber-planter, whether he plants 50 trees or 50,000. The book can be obtained from the translator, Mr. Stuart R. Cope, Old Queen street, Westminster, London; price, 3s. 9d. each per 100 copies, or 5s. single copies.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1910.								1911.				
	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.
North.													
Bowen	0·18	2·23	0·58	0·18	3·75	0·30	3·89	5·36	23·72	7·57	10·66	1·64	0·12
Cairns	3 51	6·59	Nil	3·59	1·34	1·67	7·27	11·59	34·49	27·43	35·35	52·31	2·08
Geraldton (Innisfail) ...	11·90	19·35	1·34	7·42	11·51	3·18	7·30	4·77	36·96	35·51	28·39	50·53	3·58
Gindie State Farm ...	...	2·65	1·45	Nil	...	...	...	3·87	11·69	4·15	2·29	0·29	...
Herberton	1·85	1·70	Nil	0·88	0·58	0·43	4·93	9·71	11·43	13·16	15·35	14·17	0·58
Hughenden	0·41	0·85	0·48	Nil	2·75	1·57	3·41	1·13	9·15	3·76	0·17	6·29	0·4
Kamerunga State Nurs.	...	Nil	...	3·39	...	2·06	...	..	...	23·08	...	52·28	151·0
Mackay	3·73	5·70	1·1	0·18	4·32	0·7	2·67	2·15	30·52	13·04	14·41	3·14	0·77
Mossman	...	...	...	1·91	2 90	3·17	10 36	19 91	32·76	21·95	71·64	37·10	...
Rockhampton	0 59	5·98	1·67	0·23	1·62	0·99	4·17	2·46	9·64	21·07	6·39	1·44	0·56
Townsville	0·26	1·05	0 33	0·3	3·34	0·11	2·53	6·77	25·40	19·24	4·24	3·02	0·7
South.													
Biggenden State Farm	1·06	5·25	0·92	0·28	...	2·36	4·59	5·93	10·37	7·34	6·25	..	...
Brisbane	0·43	6·74	0·39	...	2·72	3·27	2·49	13·99	10·30	5·84	4·69	0·88	0·90
Bundaberg	0·19	6·17	2·10	0·16	2·33	0·70	8·39	1·58	21·05	9·75	4·31	1·46	0·56
Crohamhurst	4·44	11·78	0·63	0·70	2·30	3·83	3·31	6·20	28·85	19·20	16·67	2·94	1·21
Dalby	Nil	6·06	1·42	0·64	2·11	3·96	4·09	3·29	8·08	2·24	3·20	0·76	0·91
Esk	0·27	4·74	0·58	0·23	4·65	3·41	3·84	7·53	11·90	6·04	3·54	0·99	1·90
Gatton Agric. College	0·61	5·05	1·99	0·60	...	3·60	2·85	6·84	12·03	3·98	2·80	1·38	0·58
Gympie	0·22	5·57	0·83	0·32	1·54	2·90	3·16	1·96	9·13	5·33	6·02	1·88	0·32
Ipswich	0·20	3·74	1·67	0·58	1·55	3·70	1·96	5·04	8·15	4·19	2·51	1·38	0·42
Maryborough	0·64	4·89	1·09	0·35	1·22	1·53	4·19	3·19	16·93	6·58	7·20	2·61	0·16
Roma	0·4	5·71	1·24	Ni	0·46	3 64	4·39	0·96	11·52	5·94	1·25	0·14	1·13
Roma State Farm ...	...	...	...	...	0·38	2 95	3·50	7 97	9·72	...	5·39	0·04	1·02
Tewantin ...	1·31	15·08	0·76	1·34	1·52	3·17	7·71	8·25	20·84	8·50	18·11	1·78	0·57
Warren State Farm ...	...	1·88	...	...	...	0·45	...	...	...	11·75	3·17	...	...
Warwick ..	0·55	3·16	1·82	0·54	1·39	2·20	3·86	3·43	7·13	2 01	3·12	0·74	1·04
" Hermitage State Farm	...	...	1·73	0·39	...	...	...	...	...	...	...	...	...
Westbrook State Farm	...	2·77	...	...	...	2·98	...	4·44	5·26	3·90	1·76	5·50	0·79
Yandina	0·40	13·13	0·70	0·15	0·88	3·34	5·16	16·05	12·04	10·73	12·02	2·68	0·28

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	JUNE. Prices.
Apples (Local), per case	3s. 9d. to 5s.
Apples (Cooking), per case	3s. to 4s. 6d.
Apricots, per case	...
Bananas (Cavendish), per dozen	$1\frac{1}{2}$d. to $3\frac{3}{4}$d.
Bananas (Sugar), per dozen	$2\frac{1}{2}$d. to $3\frac{1}{4}$d.
Citrons, per cwt.	11s.
Custard Apples, per quarter-case	3s. to 7s. 6d.
Grapes, per lb.	...
Lemons, per case	2s. to 3s.
Mandarins	3s. to 6s.
Mangoes, per case	...
Nectarines, per case	...
Oranges, per case	2s. 6d. to 4s.
Papaw Apples, per quarter-case	1s. to 1s. 6d.
Passion Fruit, per case	...
Peaches, per case	...
Pears, per quarter-case	2s. to 3s. 6d.
Persimmons, per quarter-case	..
Plums, per case	...
Pineapples (Ripley), per dozen	2s. to 4s.
Pineapples (Rough), per dozen	4d. to 1s. 3d.
Pineapples (Smooth), per dozen	1s. 6d. to 4s.
Strawberries, per doz. boxes	6s. to 10s.
Strawberries, per 2-quart tray	3s. 6d. to 3s. 9d.
Tomatoes, per quarter-case	1s. 9d. to 2s. 9d.

SOUTHERN FRUIT MARKET.

Article.	Prices.
Apples (Local), choice, per case	7s. to 9s.
Apples (Cooking), choice, per case	4s. 6d. to 5s.
Apricots, per gin case	...
Bananas (Queensland), per bunch	2s. to 7s.
Bananas (Queensland), per case	9s. 6d. to 11s.
Bananas (N. Queensland), per bunch	...
Bananas (Fiji), G.M., per bunch	2s. 6d. to 7s. 6d.
Bananas (Fiji), G.M., per case	12s.
Cocoanuts, per dozen	2s. to 2s. 6d.
Custard Apples, per tray	6s. to 7s.
Grapes, per half-case	...
Lemons, per gin case	4s.
Mandarins, per case	5s.
Mandarins (Queensland), Emperors, per case	7s. to 8s.
Oranges, per case	4s. 6d. to 7s.
Oranges (Queensland Navels), per case	9s. to 10s.
Passion Fruit, per half-case	5s. to 6s.
Papaw Apples, per case	4s. to 5s.
Peaches, per half-case	...
Peanuts, per lb.	$5\frac{1}{2}$d.
Pears, per bushel-case	3s. 6d. to 6s.
Persimmons, per half-case	3s. to 3s. 6d.
Pineapples (Queensland), common, per case	6s. to 6s. 6d.
Pineapples (Queensland), Ripley's, per case	6s. to 7s.
Pineapples (Queensland), Queen's, per case	6s. 6d. to 7s. 6d.
Plums, per half-case	2s. 6d. to 4s.
Pomegranates, per gin case	...
Quinces, per gin case	...
Tomatoes, per half-case	3s. 6d. to 5s.
Strawberries, per 3-quart tray	3s. 6d. to 4s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JUNE.

Article.		JUNE. Prices.
Bacon, Pineapple	lb.	$7\frac{1}{2}$d. to 9d.
Barley, Malting	bush.	...
Bran	ton	£5 10s.
Butter, Factory	lb.	$8\frac{1}{2}$d.
Chaff, Mixed	ton	£3 10s. to £5
Chaff, Oaten (Victorian dumped)	"	£3 15s. to £5
Chaff, Lucerne	"	£3 10s. to £5 10s.
Chaff, Wheaten	"	£2 to £2 5s.
Cheese	lb.	6d. to $6\frac{1}{2}$d.
Flour	ton	£9
Hay, Oaten (Victorian)	"	£5 to £5 10s.
Hay, Lucerne	"	£3 to £5 10s
Honey	lb.	$1\frac{1}{2}$d. to $2\frac{3}{4}$d.
Maize	bush.	2s. 2d. to 2s. 8d.
Millet (Broom)	ton	...
Oats	bush.	3s. 6d. to 3s. 9d.
Pollard	ton	£5 10s.
Potatoes	"	£6 to £9
Potatoes, Sweet	cwt.	2s. 3d. to 2s. 6d.
Pumpkins	"	2s. to 2s. 5d.
Pumpkins, Cattle	"	2s. to 2s. 5d.
Wheat, Milling	bush.	2s. 6d. to 3s. 6d.
Onions	ton	£3 15s. to £4 10s.
Hams	lb.	11d.
Eggs	doz.	1s. $6\frac{1}{2}$d. to 1s. 9d.
Fowls	pair	2s. 6d. to 3s. 3d.
Geese	"	6s.
Ducks, English	"	3s. to 3s. 3d.
Ducks, Muscovy	"	3s. 4d. to 4s.
Turkeys (Hens)	"	5s. 6d. to 6s. 6d.
Turkeys (Gobblers)	"	8s. to 14s.

TOP PRICES, ENOGGERA YARDS, MAY, 1911.

Animal.	MAY. Prices.
Bullocks	£8 10s. to £9 2s. 6d.
Ditto (single)	£10 15s.
Cows	£6 10s. to £7 2s. 6d.
Merino Wethers	19s. 3d.
Crossbred Wethers	20s.
Merino Ewes	14s. 6d.
Crossbred Ewes	19s.
Lambs	14s. 6d.
Pigs (Porkers)	31s.

PRICES OF FARM PRODUCE FOR MAY.

LONDON QUOTATIONS.

Article.	MAY. Price.
Cotton (Uplands), per lb. ...	8·02d.
Cotton (Sea Island), per lb. ...	16½d. to 18½d.
Cotton Seed, per ton ...	£8 8s. 9d.
Rubber (Pará), per lb. ...	5s. 3½d. to 6s. 8½d.
Rubber (Ceylon; Smoked), per lb. ...	6s. 5d. to 6s. 5¼d.
Copra (S.S.), per ton ...	£21 to £21 7s. 6d.
Copra (Ceylon), per ton ...	£22 15s.
Copra (Malabar), per ton ...	£23 5s. to £23 12s. 6d.
Hemp (Manila), per ton ...	£18 to £19 5s.
Hemp (Sisal), per ton ...	£19 10s. to £20 5s.
Hemp (Indian Sisal), per ton ...	£14 to £18
Hemp (Mauritius), per ton ...	£22 10s. to £25.
Ramie Fibre (China Grass), per ton ...	£42 to £48
Soja Bean Oil, per cwt. ...	30s. 6d. to 31s.
Soja Beans, per ton ...	£7 7s. 6d.
Coffee (Costa Rica), per cwt. ...	63s. to 71s.
Coffee (Good Middling to Fine Bold), per cwt. ...	67s. to 71s.
Coffee (Low Middling), per cwt. ...	63s. to 65s.
Coffee (Maragogipe), per cwt. ...	96s.
Coffee (Peaberry), per cwt. ...	61s. to 89s. 6d.

Times of Sunrise and Sunset at Brisbane, 1911.

DATE.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·30	5·1	6·39	5·3	6·30	5·18
2	6·14	5·16	6·31	5·0	6 39	5·4	6·30	5·19
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·32	5·0	6·39	5·4	6·29	5·20
5	6·15	5·14	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5·13	6·32	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·6	6·27	5·21
8	6·17	5·12	6·33	5·0	6·39	5·6	6·26	5·22
9	6·17	5·11	6·34	5·0	6·39	5·6	6·25	5·22
10	6·18	5·10	6·34	5·0	6·39	5·7	6·24	5·23
11	6·18	5·10	6·34	5·0	6·39	5·7	6·24	5·23
12	6·19	5 9	6·35	5·0	6·39	5·8	6·23	5·24
13	6·20	5·8	6·35	5·0	6·38	5·8	6·22	5·24
14	6·20	5·8	6·36	4·59	6·38	5·9	6·21	5·25
15	6·21	5·7	6·36	4·59	6·38	5·9	6·20	5·25
16	6·21	5·7	6·36	5·0	6·38	5·10	6·19	5·26
17	6·22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·6	6 37	5·0	6·37	5·11	6·18	5·27
19	6 23	5·5	6·37	5·0	6·37	5·12	6·17	5·27
20	6·24	5·4	6·38	5·0	6·36	5·12	6·16	5·28
21	6·24	5·4	6·38	5.0	6·36	5·13	6·15	5·28
22	6·25	5·4	6·38	5·1	6·35	5·13	6·14	5·29
23	6·25	5·3	6·38	5·1	6·35	5·14	6·13	5·29
24	6·26	5·3	6·38	5·1	6·35	5·14	6·12	5·30
25	6 26	5·2	6·39	5·1	6·34	5·15	6·11	5·30
26	6·27	5·2	6·39	5·2	6·33	5·15	6·10	5·31
27	6·27	5·2	6·39	5·2	6·33	5·16	6·9	5·31
28	6·28	5 2	6·39	5·2	6·32	5·16	6·8	5·32
29	6·28	5·1	6·39	5·3	6·32	5·17	6·7	5·32
30	6·29	5·1	6·39	5·3	6·31	5·17	6·6	5·32
31	6·30	5·1	...	...	6·31	5·18	6·5	5·33

PHASES OF THE MOON.

			H. M.
5 May	☾	First Quarter	11 14 p.m.
13 „	○	Full Moon	4 10 „
21 „	☽	Last Quarter	7 23 „
28 „	●	New Moon	4 24 „
4 June	☾	First Quarter	8 4 a.m.
12 „	○	Full Moon	7 51 „
20 „	☽	Last Quarter	6 51 „
26 „	●	New Moon	11 20 p.m.
3 July	☾	First Quarter	7 20 p.m.
11 „	○	Full Moon	10 53 „
19 „	☽	Last Quarter	3 31 „
26 „	●	New Moon	6 12 a.m.
2 Aug.	☾	First Quarter	9 29 a.m.
10 „	○	Full Moon	0 55 p.m.
17 „	☽	Last Quarter	10 11 „
24 „	●	New Moon	2 14 „

Plate XIX.

Eriachne melicacea, *F. v. M.*, var.

a, Base of leaf. *b*, Ligula. *c*, Top of leaf sheath. *d*, Tubercles at base of hairs. *e*, A spikelet. *f*, A flowering glume. (All enlarged.)

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to a fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field. A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds which will begin to vigorously assert themselves as the weather gets warmer; therefore keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent planting of cuttings from the old vines, and to obtain cuttings from other districts. If grasses have not yet been sown, there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn-out sugar lands in the Central and Northern districts, if not intended to be manured and replanted, will bear excellent crops of sisal hemp. Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

KITCHEN GARDEN.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnip, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

4

FLOWER GARDEN.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2.63 in., and for September 2.07 in., increasing gradually to a rainfall of 7.69 in. in February.

Orchard Notes for August.

THE SOUTHERN COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of Citrus Fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well balanced main branches cut off at about 2 ft. from the trunk. When cut back give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they may be allowed to throw out a number of shoots, which should be thinned out to form a well balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good clean grown stocks I prefer budding.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient, but if of large size, then the best method is

the side graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In selecting wood for grafting, take that of the last season's growth that has good full buds and that is well-matured—avoid extra strong or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or less extent.

Where necessary, quickly-acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be harrowed or cultivated in; but, in the case of pines, they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as I am satisfied that the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and from this one shoot you can make any shaped vine you want. Just as the buds of the vines begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead—viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The Spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is

thoroughly sweated, as unless the moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their Winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got read for Spring.

In the warmer parts, grape-pruning should be completed, and the vines should receive the Winter dressing for black spot. In the Stanthorpe district grape-pruning should be delayed as late as possible, so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping Spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds; side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, I prefer to head back and work out by budding on the young growth.

Plate XV.

Grapes and Plums Grown by R. Pawsey, Nigger Creek, Herberton.

The Herberton Highlands.

By GEORGE GOODMAN.

From the Hon. J. G. Appel, Home Secretary, the following interesting description of the Highlands of the Herberton, by Mr. George Goodman, has been received by the Secretary for Agriculture, the Hon. J. Tolmie, M.L.A., for publication in the "Queensland Agricultural Journal." Mr. Goodman, who is a press contributor, takes a very keen interest in agricultural pursuits in the development of our State. The illustration, showing grapes and plums grown by Mr. R. Pawsey, of Herberton, will furnish evidence of the adaptability of soil and climate to the growth of European fruits. Parenthetically, we may state that we have on three occasions visited this magnificent portion of Queensland, and can endorse all that Mr. Goodman so poetically describes. We often suggested to the residents the probability that trout would thrive in the bright, permanent, cool mountain streams which are so numerous in the district right away to the Lower Russell. As to the climate, we, on one occasion, sat over a comfortable log fire on New Year's Eve at Atherton. Mr. Goodman's article was published in the "North Queensland Register," to which journal our acknowledgments are due. Mr. Goodman writes:—

"Much very fine descriptive writing has been inspired by the scenic beauties of the Barron Falls at Kuranda, and the lovely extensive views from the surrounding mountains. But, while admitting and appreciating all that can be said for the famous tourist resort, the writer's choice for a holiday lies with the Highlands of Herberton. The altitude, approaching 4,000 ft., ensures a crispness in the air that acts as an invigorating tonic (one feels impelled to be active); and from any of the many peaks a panorama of folded hills and smiling valleys lies north, south, east, and west.

"Herberton nestles in the vicinity of the birthplace of three rivers (the Great Western Dividing Range). The Walsh heads within a few miles of the town, and pursues its way by tortuous course to the Mitchell, flowing, uncharted, into the Gulf of Carpentaria. A short, very short distance north, the Wild River, whose springs are hidden in a dense scrub, flows south to pay tribute of its waters to the Herbert, and about 9 miles east, the baby Barron dances its rocky way to the 'Falls' and the sea. On Sunday, 14th August, a picnic party of twenty-six, under the leadership of Mr. Ledlie (than whom no more genial host could be found) rode out to the head of the Barron. The day was perfect; and as the cavalcade rode in single file over the rugged ridges it formed a striking picture. The track runs over granite ridges, which before long will be covered with orchards of English fruits and vineyards. Already raspberry vines run rampant, and the breast-high grass bears witness to the wonderful fertility of the soil.

"The objective of the party was the 'Crater,' one of the most peculiar of the many geological freaks of North Queensland. 'Crater'

is really a courtesy title, as the absence of lava or volcanic soil of any kind proves pretty conclusively that some action other than fire is responsible for its being. This immense cavity, in shape oblong, about 500 ft. long, 300 ft. across, and 280 ft. deep to the water, lies on the extreme top of a steep ridge, is concealed by dense scrub, and not until one is on its very verge is one aware of its presence. The first feeling is one of awe. Silence pervades the scene. Sheer cliffs broken by patches of shrubs descend till the greenish-coloured water meets the eye. How did it come? Usually a crater is well defined, even as is Lake Eacham. Its lip rises above the surrounding plateau, and although clothed with jungle, still one is never in doubt that, in past ages the forces of the earth held their giants' play. Here, however, there is no sign of activity. The granite walls hold their secret well. Was it an immense spring? Search the surrounding country as you will, no trace of limestone or basalt can be found. The depth from lip to water is given as 280 ft., with a depth of 210 ft. of water, or, roughly, a total depth of nearly 400 ft. One of the party throws a stone over, and, after a lapse of perhaps four seconds, a thousand echoes reverberate from side to side of the chasm. The writer has seen extinct volcanoes in New Zealand, but none of them gave him the same feeling of wonder as the 'Crater' on the Hugh Nelson Range.

"From a ridge a little to the east, a magnificent panoramic view shows the fertile Barron Valley wherein, here and there, clearings show the homes and work of the settlers. To the north the green fields of Atherton mark the end of the tropical jungle, and almost glisten in the sun; while to the east Bellenden-Ker and Bartle Frere lift their cloud-crowned summits to the sky. Imagine the scene. For a distance of 25 to 30 miles wide, as the crow flies, and as far south as the eye can reach, stretches the wonderful tableland destined to yield its timber wealth and wonderful fertility to a prosperous white population.

"Probably no part of Australia is better watered than the Highlands of Herberton. Never-failing streams run east and west from the jungle-covered range, and that there are wonder and beauty spots as yet unseen by the eye of white men is hardly a matter of conjecture. A few weeks ago an expedition, which included Mr. J. Sharp, artist, of Atherton, went to visit some recently discovered falls known to the blacks by the name of 'Cannaplin,' and which were sketched and painted by Mr. Sharp. A conservative estimate gives the height as 550 ft. of sheer fall, unbroken by rock or cataract, until the water crashes on its stony bed below.

"Last week Mr. Morris, of the Killarney Hatchery, arrived with 200,000 trout ova, and within the next three years there should be good angling in the highland streams. It is intended, should the ova be successfully hatched, to distribute trout in Cedar Vine Creek, and the Mill stream, and with the facility given by railway communication there is no reason that the Herberton Highlands should not be the summer or winter resort of thousands of Western Queenslanders. The climate in any season is ideal, cool summers and mild winters, clear ever-running streams, and a homely, hospitable people, who possess a natural gift to make the stranger welcome."

Agriculture.

COTTON-SEED AND COTTON-SEED OIL.

The seed as it issues from the gin has still attached to it (in the case of woolly seed cottons) a small quantity of cotton; and the kernel, or meat, is covered with a hard envelope—the hull. The subsequent operations are:—The storage of the seed; the removal of the residue of cotton, called "linters"; the hulling, &c.; separation of the kernels from the hulls; and the extraction of the crude oil, leaving the cotton-seed meal. Cotton seed is bulky, 1 ton occupying 38 cubic ft. of space; it is also liable to deterioration on keeping. It is, therefore, advisable to deal with the seed as rapidly as possible.

The following is a brief outline of the manufacture of cotton-seed oil and its by-products:—

The cotton seed is shovelled from the carts into a bucket elevator, whence, by a screw conveyer, it is carried to chutes, and discharged into storage-rooms.

From the storage-rooms it is carried, as required, by elevators and conveyers to the revolving "boll screen," which retains bolls and other large impurities and allows the seed to pass through; it is similarly conveyed to a fine revolving screen, which retains the seed and allows sand to pass. Hence it is conveyed to the blower, which expels fine dust and blows the seed over magnetic plates, the purpose of which is to retain fragments of iron brought from the gin.

These cleaning operations reduce the weight of the seed by 6 per cent. The fragments of cotton still adhering to the seed, if not removed, would absorb some of the oil expressed in the subsequent operations, and prevent its effectual extraction. The next process, then, is to convey, automatically, the clean seed to the "linters," which is a large saw-gin capable of working up 16 to 24 tons in 24 hours. This removes the short fibre, which, taking its name from the special gin, is called "linters," and is used to make hats and cheap cloth, and is sold at a lower price than lint.

A conveyer now carries the seed to the "huller," which consists of two concentric cylinders, the outer one stationary, the inner one revolving 850 times a minute, and each is provided with knives which cut the seed and allow the meat or kernels to drop out. The meats and hulls pass to a revolving screw, where the former drop through, the hulls being retained, and afterwards removed to be used either as fuel, as bran for cattle food, or to be manufactured into fibre for paper.

In the United States, in districts where coal sells at 3.5 dollars (14s. 8d.) per ton, the hulls are valued at 80 cents. (3s. 4d.) per ton as fuel. The following is a proximate analysis of the hulls:—

Water	11.36
Fat	2.22
Protein (albuminoids)*	4.18
Nitrogen-free Extract (carbohydrates)	34.19
Fibre	45.32
Ash†	2.73
* Containing nitrogen	.69
† Containing phosphoric acid	.25
† Containing potash	1.02

This analysis at once indicates the approximate value of the hull bran as a food, especially when mixed with cotton-seed meal. It also indicates the desirability of returning this material directly to the land, or indirectly in the manurial residue from cattle, in order to prevent the loss of the fertilising ingredients.

The meats next pass between a heavy series of chilled iron rollers, which mash them into thin flakes, and crush the oil cells, and are then conveyed to the heaters, which are cast-iron, steam-jacketed kettles provided with stirrers; here, the meats are heated for 20 or 30 minutes, the time being decided by an experienced workman; the water is thus driven off, and the oil rendered more fluid.

The meats are then shaped into cakes in the "former," and either wrapped in camels'-hair cloth or placed on shallow steam frames, and taken to the hydraulic press, where they are subjected to a pressure of 3,000 to 4,000 lb. to the square inch.

The crude oil runs from the press to the settling tank, and the cake, solid as board, is stripped, weighed, and stacked to dry, afterwards being broken into lumps and ground into cotton-seed meal.

The following is an average analysis of samples of cotton-seed meal:—

Water	7.80
Fat	9.31
Protein (albuminoids, &c.) *	42.00
Nitrogen-free extract (carbohydrates, &c.)	27.83
Fibre	7.18
Ash †	5.88
* Containing nitrogen	6.72
†Containing phosphoric acid	2.42
† Containing potash	1.95

Cotton-seed meal is one of the richest and most valuable cattle food-stuffs. Its food value exceeds that of corn meal by 62 per cent., and wheat meal by 67 per cent.

It is also a valuable manure, chiefly on account of its richness in nitrogen, but it is far more economical to feed it to cattle, when 80 per cent. of its manurial value is recovered in the dung.

OIL.

The yield of crude oil amounts to about 45 gallons per ton of seed. It is allowed to remain some hours in the oil-settling tank, and the sediment called "foots" is re-heated and re-pressed, and the residue sold as soap stock. The oil is drawn off and barrelled, and exported as crude oil or as "refined."

REFINING OF COTTON SEED OIL.

The crude oil is heated, agitated by blowing air through it, and treated with caustic soda to coagulate the impurities, which sink to the bottom of the tank. The oil is then drawn off, washed with water, again drawn off, and passed through the filter-press. It then constitutes the "summer yellow" of commerce, which is employed in the manufacture of margarine and butterine, and the tempering of steel.

From "summer yellow," if artificially cooled, separates solid stearin; from this, cotton-seed salad oil may be separated by pressure, the stearin being employed in the manufacture of butterine.

"Summer yellow," by being treated with Fuller's earth or other bleaching agent, is converted into "summer white," and this, by cold

and pressure, is separated into white stearin (solid), used in the manufacture of "compound lard" and "winter white," a colourless oil used as a fuel for miners' lamps, and for the making of medicinal compounds.

CENTRAL OIL FACTORIES IN THE UNITED STATES.

A common arrangement in the cotton-growing States is for the central mills to offer 1 ton of meal for 2 tons of seed, including freight both ways. It is claimed that this arrangement is profitable to both parties, as the meal contains substantially all the fertilising ingredients of the seed, and is in a form far more suitable for cattle food. For these reasons, it would appear to be an arrangement well suited to the needs of those who grow cotton.

AREA UNDER COTTON REQUIRED FOR AN OIL FACTORY.

An area of 6,000 acres of cotton would suffice to keep a small central oil factory employed for 100 days. This would obviate the necessity of exporting the seed, and local growers would obtain the benefit of the by-product. The seed might be exchanged for cotton-seed meal, or the planter might pay so much a ton for the manufacture, and receive an amount of meal equivalent to his seed plus a proportionate share of the proceeds of oil sales.

COST OF A COTTON-SEED OIL PLANT.

C. P. Brooks (U.S.A.), in his work on cotton, estimates as follows the cost of the erection of the plant for the manufacture of cotton-seed oil and its by-products:—

Capacity for Twenty-four Hours in Tons.	Buildings, including Oil Mill, Boiler, Seed and Meal Houses.	Land and Railway Siding and Water Supply.	Pressroom Machinery, f.o.b. Factory.	All other Machinery in Oil Mill to make Crude Oil.	Freight and Erection.	Total for Oil Mill Boiler, Seed and Meal Houses.	Refinery, including Buildings and all machinery.	Total for Oil Mill and Refinery.	Ginnery, 6-Stand Gins and Cotton Warehouse.	Total for Oil Mill, Ginnery, and Refinery.
Tons.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.
10 to 20	5,000 (£1,000)	1,000 (£200)	4,500 (£900)	5,000 (£1,000)	2,000 (£400)	17,500 (£3,500)	... ...	... ...	... ...	... ...
20 to 30	10,000 (£2,000)	2,000 (£400)	6,400 (£1,280)	8,500 (£1,700)	4,500 (£900)	31,400 (£6,280)	11,600 (£2,320)	43,000 (£8,600)	15,000 (£3,000)	58,000 (£11,600)

—From Bulletin No. 33 of the United States Department of Agriculture, issued in 1896.

WHAT BOYS ON THE FARM CAN DO.

When we find that the statistics referring to the average yield of maize per acre in Queensland, with her rich soils and splendid climate, only amounts to 24.66 bushels, one naturally begins to wonder how the return can be so small, especially when it is well known that yields of from 80 to over 100 bushels per acre are frequently obtained. There is no doubt that whilst soils and seasons are potent factors in crop production, yet selection of seed is no less contributory to a successful result. For substantiation of this, we refer our readers to volume xxii. of this

journal (May, 1909, p. 220). Under the heading of "Maize Culture," a most instructive article (illustrated), taken mainly from reports of experiment stations in the United States, appears, which we commend to the careful perusal of maize-growers in Queensland. Of course the general farmer cannot take up "corn-breeding," which is a special industry in America, as it should also be here. But much can be done in this direction, even by the young people on the farm. The following report from an American publication shows what boys can do in the way of raising big crops of maize, under suitable direction:—"More than 12,000 Southern boys less than eighteen years old planted and cultivated an acre of maize each last year, under the direction of the Department of Agriculture. The average yield of maize to the acre in 1909 was a little more than 25 bushels. The South Carolina boys, who made the best record, produced 152½ bushels; the winning Mississippi boy raised 147 bushels; the Arkansas boy, 135 bushels; and the boy in Virginia, 122 bushels. The average raised by each of the 12,000 was 60 bushels. The instructions given to those boys by the Department of Agriculture are available to every farmer in the country. It is beyond doubt that larger crops can be produced from 10 acres thoroughly tilled than from two or even three times 10 acres cultivated as they usually are. The fact that the prize-winner raised more maize on 1 acre than the average farmer produces from 6 tells a story that should not be lost upon those for whose benefit the experiment was made.

A NEW PROLIFIC WHEAT.

Last month Mr. H. Tye, Principal of the Dookie Agricultural College, and a co-worker of the late Mr. Farrer, the New South Wales Government wheat expert, and the discoverer of "Federation" wheat, informed the New South Wales Minister for Agriculture that he had evolved a cross between "Federation" and another wheat, which, for two seasons, has surpassed the yield of the former by an amount equal to several bushels per acre. To form some idea of the great importance of this discovery, a few statistics are required. The area under wheat in New South Wales in 1910 was 1,990,180 acres, which, with an average yield of 14.3 bushels per acre, returned 28,532,029 bushels, valued at, say, £5,000,000 in round numbers. If the whole of the above area had been planted with a wheat yielding 3 bushels more per acre, the figures would have been augmented by 6,633,933 bushels, representing an additional cash return of £1,160,938. What must be the value to the State of a man whose scientific knowledge enables him to effect such a result?

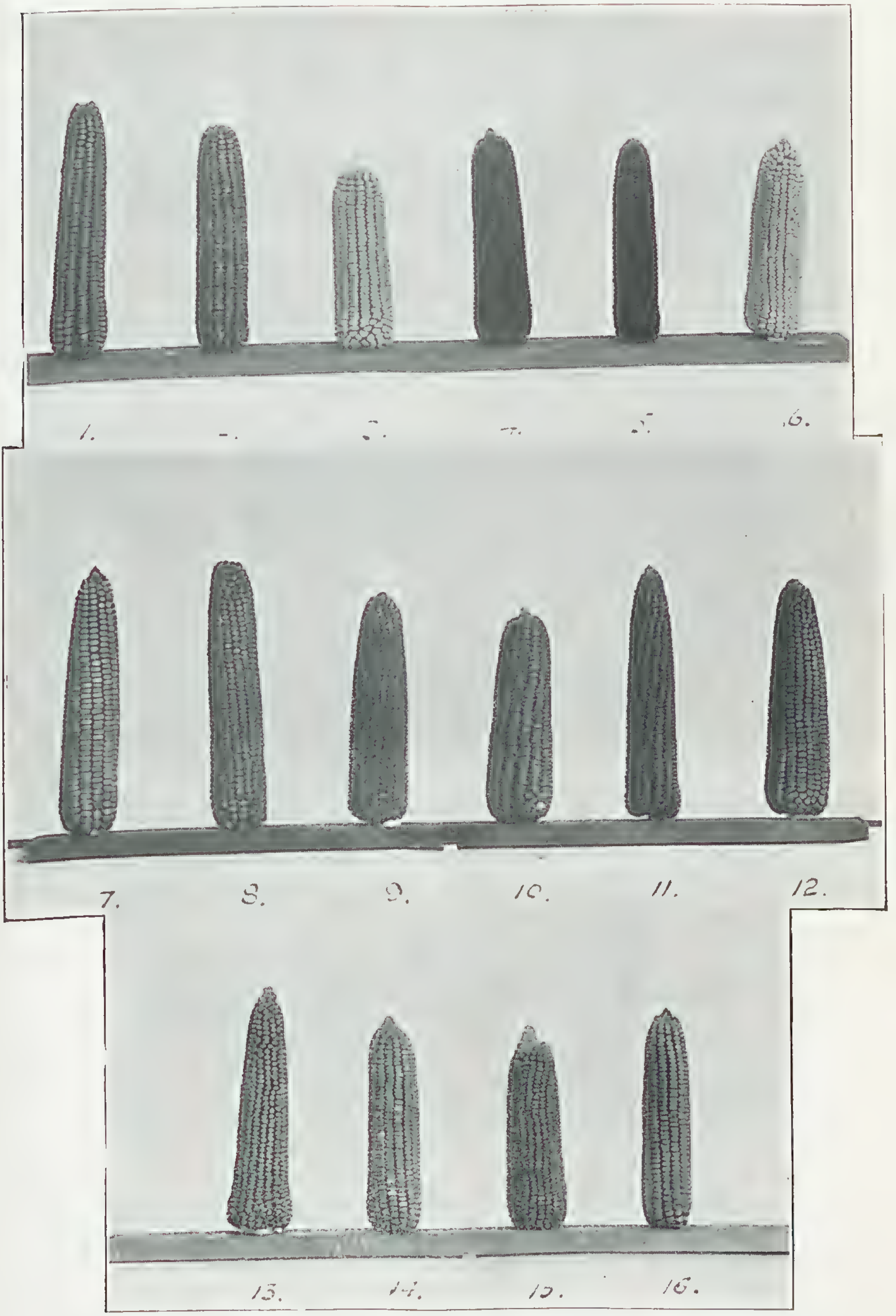
WHAT BOYS CAN BE TAUGHT AT THE STATE SCHOOLS.

In this issue we illustrate the value of the lessons learnt by the State school teachers during the annual course of instruction at the Queensland Agricultural College, to which they voluntarily submit themselves during the winter vacation, in order to enable them to instruct their pupils in the various industries incidental to farm life in Queensland. At the State school at Sugar Loaf, near Stanthorpe, the head teacher, Mr. Geo. H. Boyden, has been most successful in instructing his young charges, particularly in maize-growing; and the latter are well deserving of praise for the result of their labours, as shown in the photographs.

Plate XVI.

PLOT OF MAIZE GROWN BY PUPILS OF THE STATE SCHOOL, SUGARLOAF, NEAR STANTHORPE.

Plate XVII.



Samples of Maize Grown at the State School, Sugarloaf, near Stanthorpe.

1. Peasie Queen. 2. Bolderwood. 3. Hickory King. 4. Japanese Red. 5. Red Kentucky Moonshine. 6. Boone County Special (One-fifth natural size). 7. Golden King. 8. Prairie Queen. 9. Eclipse. 10. Golden Nugget. 11. Improved Red Hogan. 12. Improved Sydney Red. 13. Flint. 14. Yellow Dent. 15. Clarence Wonder. 16. Large Yellow.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF JUNE, 1911.

AYRSHIRES.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
		Lb.		Lb.		£ s. d.
Lerida	15-2-1911	830	3·6	33·2	1s. 0d.	1 13 2
Linda	12-2-1911	782	3·9	34·03	„	1 14 0
Lady Margaret ...	4-2-1911	765	4·0	34·19	„	1 14 2
Lark	22-12-1910	735	3·8	31·12	„	1 11 1
Queen Kate ...	12-12-1910	662	3·8	28·03	„	1 8 0
Davidina	7-10-1910	559	4·9	30·90	„	1 11 0
College Lass ...	23-8-1910	517	5·5	29·26	„	1 9 3
Lass	6-11-1910	496	4·5	25·08	„	1 5 1
Conceit	17-11-1910	369	5·6	24·24	„	1 4 3
Nine cows ...	...	5,715	35·6	270·05	„	13 10 0
Average ...	...	635	3·9	30·01	„	1 10 0

Lady Margaret, Queen Kate, and Davidina, Imported—First calf.

SHORTHORNS.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
Nellie II. ...	30-11-1910	729	3·3	26·58	1s. 0d.	1 6 7
Butter	15-9-1910	404	5·6	26·46	„	1 6 5
No. 6	2-3-1911	399	5·2	24·33	„	1 4 4
Three cows ...	...	1,532	14·1	77·37	„	3 17 4
Average ...	...	511	4·7	25·79	„	1 5 9

JERSEYS.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
Cocoa	1-5-1911	631	4·1	28·93	1s. 0d.	1 8 11
Careless	16-12-1910	416	4·7	22·0	„	1 2 0
Bluebell	20-4-1911	395	5·1	22·75	„	1 2 9
Three Cows ...	...	1,442	13·9	73·68	„	3 13 8
Average ...	...	481	4·6	24·56	„	1 4 7

LINCOLN RED.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
Red Rose	1-3-1911	657	4·5	33·22	1s. 0d.	1 13 3
Burton's Maid ...	21-2-1911	383	5·6	25·08	„	1 5 1
Bracebridge II. ...	...	340	5·2	20·68	„	1 0 8
Three Cows ...	...	1,380	15·3	78·98	„	3 19 0
Average ...	...	460	5·1	26·33	„	1 6 4

HOLSTEIN.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
		Lb.		Lb.		£ s. d.
Daisy	2-2-1911	688	3·3	25·08	1s. 0d.	1 5 1

GRADES.

Cow.	Breed.	Date of Calving.	Milk (lb.)	Test.	Butter (lb.)	At per lb.	Value.
							£ s. d.
Maggie	Holstein-Shorthorn	10-2-11	623	3·3	22·7	1s. 0d.	1 2 8
Mona	,,	14-9-10	381	4·8	20·6	,,	1 0 7
Two Cows ...	...	...	1,004	8·1	43·3	,,	2 3 3
Average ...	...	...	502	4·0	21·6	,,	1 1 8

The following cows each received a daily ration of 25 lb. chaff (ensilage and lucerne mixed, equal proportions), 3 lb. boiled barley, 2 lb. crushed oats, 1 lb. bran, ½ lb. linseed, and 8 lb. green barley; Lady Margaret, Linda, Lerida, Lark, Davidina, College Lass, Queen Kate, Butter, Daisy, Lass, and Bracebridge II.

The other cows each received 25 lb. ensilage (panicum) and were grazed on natural pasture.

AVERAGES FOR MONTH OF JUNE.

No.	Breed.	Milk (lb.)	Test.	Butter (lb.)	At per lb.	Value.
						£ s. d.
9	Ayrshire	5,715	35·6	270·05	1s. 0d.	13 10 0
3	Shorthorn	1,532	14·1	77·37	,,	3 17 4
3	Jersey	1,442	13·9	73·68	,,	3 13 8
3	Lincoln Red	1,380	15·3	78·98	,,	3 19 0
1	Holstein	688	3·3	25·08	,,	1 5 1
2	Grades	1,004	8·1	43 3	,,	2 3 3
21	...	11,761	90·3	568·46	,,	28 8 4
	Average	560	4·3	27·07	,,	1 7 1

Average cow value £1 7s. 1d. for month of June, 1911.

MACHINE v. HAND MILKING.

The "Live Stock Journal" for 19th May gives the following results of experiments in milking recently made in Belgium:—

"With a view to determining whether milking by the machine was more thorough than by hand, trials were carried out in which four cows were milked by hand for ten days, and by machine for the succeeding sixteen days. In each case three milkings were made per day, and the amount of milk left in the udder determined immediately after milking, by means of a supplementary milking. With two cows the machine gave better results, and with the other two cows hand-milking was more thorough. The results, on the whole, however, were in favour of the machine, whether the absolute amount of milk left in the udder be considered or the ratio of this amount to the amount actually obtained. The milk left in the udder per cow per day, after mechanical milking, was 0.50 pint, as compared with 0.59 pint after hand-milking. A longer time was taken to empty the udder by machine than by hand, a fact which might have had some influence on the yield. Though the amount of milk obtained from the first morning's milking (6.15 a.m.) was in the case of both methods almost double that obtained at either of the two subsequent milkings, it was noticeable that there was no appreciable difference in the amount left unmilked at the three milkings. To ascertain the influence of the machine on the total milk production, the four cows were milked solely by machine for four and a-half months. The cows which were milked by machine gave a higher yield by about 2 lb.

THE SISAL HEMP MARKET.

Messrs. Landauer and Co., fibre brokers, London, reporting on the hemp market on 31st May last, state:—

Sisal Hemp.—The market has been constantly advancing, latest quotations being 4⅝ cents. to 4⅜ cents., equal to £22 10s., c.i.f., Europe, for fair average quality.

Mauritius Hemp (Fourcroya).—Steady. A good general inquiry prevails for prime quality, which is quite unattainable on spot. Recent arrivals have been disposed of on the basis of £24 10s. to £25 10s. for good fair, and £22 to £23 for ordinary, and £27 for prime. It appears that this article is exceedingly scarce, offers from the place of production being very difficult to obtain. While going to press, we have received a private cable from Yucatan quoting £23 10s. for sisal hemp, without even getting a firm offer thereat.

Binder Twine.—The entire surplus of binder twine, carried over last season, will be absorbed, and, generally, the market conditions will become more healthy than they have been for some considerable time past. The consumption, at present, is an extraordinarily heavy one.

Manila Hemp.—The position has been strengthened owing to another sharp advance in the price of Mexican sisal. Various reports from the Philippines all confirm that the production is falling off, and, whilst we were of opinion that a sharp rise was to be expected in autumn, it seems that we have been forestalled, and that the recent enhanced values are the forerunner of a higher range of values, likely to be of long duration.

Poultry.

REPORT ON EGG-LAYING COMPETION, Q.A. COLLEGE, JUNE, 1911.

One thousand four hundred and sixty-five eggs were laid during the month. A good many of the birds are still in moult, two of Padman's and one of Holmes' being affected, in addition to those mentioned last month. During the last ten days, however, there has been a great improvement in the laying, and a good return may be looked for in July. Mr. J. F. Dalrymple wins the monthly prize with 123 eggs. The following are the individual returns:—

Yangarella Poultry Farm, White Leghorns	103	286
A. Hollings, N.S.W., White Leghorns	94	265
Range Poultry Farm, White Leghorns	86	258
J. F. Dalrymple, N.S.W., White Leghorns	123	255
Alex. Smith, White Leghorns	99	252
E. A. Smith, White Leghorns	74	243
J. Holmes, White Leghorns	78	229
Cowan Bros., N.S.W., White Leghorns	90	218
A. H. Padman, S.A., White Leghorns	64	215
Jas. McKay, White Leghorns	62	208
Mrs. Kinnear, S.A., White Leghorns	72	206
H. Hammill, N.S.W., White Leghorns	52	201
A. J. Cock, S.A., White Leghorns	57	201
R. Burns, White Leghorns	72	158
J. Gooley, White Leghorns	78	153
S. Chapman, Brown Leghorns	62	153
J. Zahl, White Leghorns	63	139
R. Burns, S.L. Wyandottes	60	121
A. Astill, White Leghorns	50	109
Mrs. A. A. Carmichael, Brown Leghorns	26	82
R. W. Goldsbury, White Leghorns	1	58
J. K. Stewart, White Plymouth Rocks (No. 1)	4	23
J. K. Stewart, White Plymouth Rocks (No. 3)	0	13
J. K. Stewart, White Plymouth Rocks (No. 2)	0	0
Totals	1,465	4,046

THE BLACKBERRY PEST.

Mr. N. Weppner, Dalby, writes as follows on the means to adopt for the destruction of the blackberry plant:—"Having noticed in the journal suggestions for the destruction of blackberries, and also having had considerable experience in dealing with them, I would like to say what I have succeeded in doing. I have dealt with the blackberry where it has attained a height, amongst trees, of 30 ft. I simply cut round the high bushes as far as I could with a slasher or fern hook in the summer time, and let the vines dry for a couple of days, after which they would burn. Then I cut more down until the whole was cut down and burnt. I then kept the infested paddock stocked with sheep, which eat the young shoots readily. The cut blackberry must always be burnt off before putting on sheep, as the thorns would otherwise stick in the wool and cause trouble.

The Orchard.

PAPAW CULTURE.

Notwithstanding that the papaw will almost grow and thrive in sand, it, like other plants, likes good soil. The position chosen for planting should be sheltered from cold, westerly winds, as the tree is apt to be seriously injured by frosts and cold winds. The seed should be sown in September in rich soil in a sheltered spot. When the seedlings have attained a height of from 6 to 9 in., they may be removed to their permanent positions. It is better to plant close—say, 6 ft. apart—which will allow for thinning out, at the first flowering of the trees (which will occur in ten or twelve months after planting out), of those bearing the long-panicled flowers, which are mostly male, the female flowers, if any, on them bearing poor fruit. Each young seedling should be shaded with a small leafy branch when planted out, and a light mulch of leaves or light stable manure should be given, as this helps to retain moisture and keep the surface soil loose.

The female tree bears numbers of flowers close to the stem at the axils of the leaves, and these require to be thinned out to give room to the succeeding crowded fruit to develop.

As far as sowing the seed is concerned, we have found that it germinates freely if sown at any time between spring and autumn. The permanent position should have a south-easterly aspect. If the seed is sown in the summer months, plants will be ready to put out in early districts in August. It is of little use planting out during the cold months as the young plants, even if not frosted, would probably die. As an experiment, we planted out twenty-four young plants 18 in. high last April. Of these only ten have survived the late cold snap. Care should be taken, when removing the plants, not to injure the stem.

It is said that the male tree can be made to bear good fruit by cutting off the head. We have tried this plan without success.

In the "Agricultural Bulletin" of the Straits and Federated Malay States, an account is given by a fruit-grower—Mr. Jesse, in the Jolo Archipelago, near Borneo—of his method of growing papaw apples. Notwithstanding what we should imagine to be an ideal climate for this fruit, it appears that its cultivation is far more laborious than with us in Queensland, where, in the North, it grows like a weed and produces perfect fruit with no cultivation whatever. We do not think the work, as described, would be of any value to our readers; but the third stage of Mr. Jesse's process, describing "forced nourishment," might prove interesting to papaw-growers. The *modus operandi* of the forced nourishment treatment is described as follows:—"Bore a hole into the trunk about 6 in. from the ground, 1 in. deep, and of a diameter slightly larger than that of the red rubber tubing obtainable at your drugstore. Fill a quart bottle half full of sugar and dissolve in water. When the sugar is thoroughly dissolved, connect the bottle with the hole in the tree by means of the red tubing. In 24 hours the tree will have absorbed the contents of the bottle."

Horticulture.

THE NARCISSUS AFTER FLOWERING.

The principal cause of failure in these sweetly-perfumed flowers is late planting, irrespective of variety. Some varieties may be planted as late as May or June without any appreciable falling off in quality or quantity of blossom. Others bloom freely in June, and such varieties cannot be planted too early—Poeticus, for example, which includes *P. ornatus,* a pure white, the cup margined scarlet; and *P. plenus* (Gardenia-flowered), a double, pure white, highly fragrant. The best soil for the narcissus is a nice, moist, sandy loam; and, once planted, they may be left alone for years, for it is not at all necessary nor is it advisable to transplant the bulbs annually. If any have to be removed, they should be at once planted elsewhere. The foliage should not be cut off while green, when the flowering season is over. The abundant green foliage is then, however, very unsightly in the garden, and amateur gardeners often cannot resist the temptation to cut it away. There is a method of making the narcissus bed tidy, which was communicated to a Southern newspaper by a lady amateur gardener. She finds a way out of the difficulty by carefully separating the foliage of each plant and tying it into a knot. It was argued by a neighbour that, as a result of this method, the sap would not be able to run down freely to the bulb, and that the flowers of the following season would be poorer in consequence; but such was not the result. The lady said that the bulbs do not suffer in any way, and that the plants flower splendidly during the following season.

It should be noted by narcissus-growers that the bulbs should on no account come into contact with crude manure, for, if they do, they will assuredly be injured. Drying the bulbs is a very bad practice. As a general rule, lift, divide, and plant out at once.

MAIZE AS A CATCH CROP.

It is suggested in "Tropical Life" (vol. vi., No. 11) that the cultivation of maize on rubber estates might be profitable either as a means of preparing the land for planting rubber trees or as a catch crop between the trees after planting.

In lalang ground maize would be especially suitable as a first crop, and only one ploughing would be necessary providing it was thoroughly done. While the maize is growing the grass and weeds are decomposing, and after harvesting the crop the ground is easier to clear. Then, too, the maize crop should pay the expenses of preparing the ground for planting the rubber trees.

Where the plantations have already been started, maize could be grown between the rows of rubber trees and serve as a means of keeping the ground clear of weeds as well as paying part of the expenses of cultivation.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

List of the herbarium specimens, live plants, and seed collected during His Excellency Sir William Macgregor's late tour of the Gulf of Carpentaria and Torres Strait:—

CAPPARIDEÆ—
Polanisia viscosa, *DC.* Moa Island.
Capparis canescens, var. glauca, *Benth.* Moa Island.

VIOLARIEÆ—
Ionidium suffruticosum, *Ging.* Bountiful Island.

POLYGALEÆ—
Polygala arvensis, *Willd.*, var. Mapoon. Australian Milkwort.

CARYOPHYLLEÆ—
Polycarpæa synandra, *F. v. M.* Mapoon.
Polycarpæa breviflora, *F. v. M.* Badu Island.

PORTULACEÆ—
Portulaca australis, *Endl.* Wai Weir Island.

MALVACEÆ—
Sida subspicata, *F. v. M.* Bountiful Island.

STERCULIACEÆ—
Melhania incana, *Heyne.* Mornington Island.
Abroma fastuosa, *R. Br.* Darnley Island.

TILIACEÆ—
Grewia polygama, *Roxb.* York Island.

ZYGOPHYLLEÆ—
Tribulus cistoides, *Linn.* York Island. Cat's-head.

RUTACEÆ—
Micromelum pubescens, *Blume.* York Island.

STACKHOUSIEÆ—
Stackhousia viminea, *Sm.* Nagi Island.

AMPELIDEÆ—
Vitis acetosa, *F. v. M.* Mabuiag Island. A native grape.

SAPINDACEÆ—
Dodonæa viscoca, *Linn.* Mabuiag Island. One of the hop bushes.

LEGUMINOSÆ—
Crotalaria linifolia, *Linn.* Mabuiag Island.
Crotalaria calycina, *Schranck.* Wai Weir Island.
Crotalaria striata, *DC.* Murray Island.
Indigofera linifolia, *Retz.* Bountiful Island.
Indigofera brevidens, *Benth.* Yama Island.
Indigofera Baileyi, *F. v. M.* Murray Island.

Leguminosæ—*continued.*

Tephrosia purpurea, *Pers.* Cocoanut Island.
Zornia diphylla, *Pers.* Mabuiag Island.
Abrus precatorius, *Linn.* Mapoon.
Clitoria ternatea, *Linn.* Murray Island.
Erythrina insularis. Yama Island.
Canavalia obtusifolia, *DC.* Saibai Island.
Phaseolus Truxillensis, *H. Bandk.* Yama Island.
Vigna lutea, *A. Gray.* Saibai Island.
Cassia glauca, *Lam.* Yama Island.
Cassia mimosoides, *Linn.* Moa Island.
Acacia aulacocarpa (no pods). Saibai Island.
Pithecolobium moniliferum, *Benth.* Saibai Island.

Droseraceæ—

Drosera indica, *Linn.* Badu Island. A native sundew.

Combretaceæ—

Teminalia platyphylla, *F. v. M.* Mornington Island.

Myrtaceæ—

Eucalyptus terminalis, *F. v. M.* Mornington Island.
Tristania sp. Moa Island.
Fenzlia obtusa, *Endl.* Badu Island.

Passifloreæ—

Passiflora aurantia, *Forst.*, var. Banksii, *Bail.* Mabuiag Island.

Rubiaceæ—

Cœlospermum reticulatum, *Benth.* Bountiful Island.
Myrmecodia Antoinii, *Becc.* Moa Island. (Plate XVIII.)
Spermacoce stenophylla, *F. v. M.* Moa Island.

Compositæ—

Wedelia asperrima, *Benth.* Peak Point, Cape York.
Pluchea tetranthera, *F. v. M.* Badu Island.

Campanulaceæ—

Lobelia dioica, *R. Br.* Moa Island.
Wahlenbergia gracilis, *A. DC.* Yama Island.

Plumbagineæ—

Plumbago zeylanica, *Linn.* Goode Island.

Ebenaceæ—

Diospyros hebecarpa, *A. Cunn.* Darnley Island.

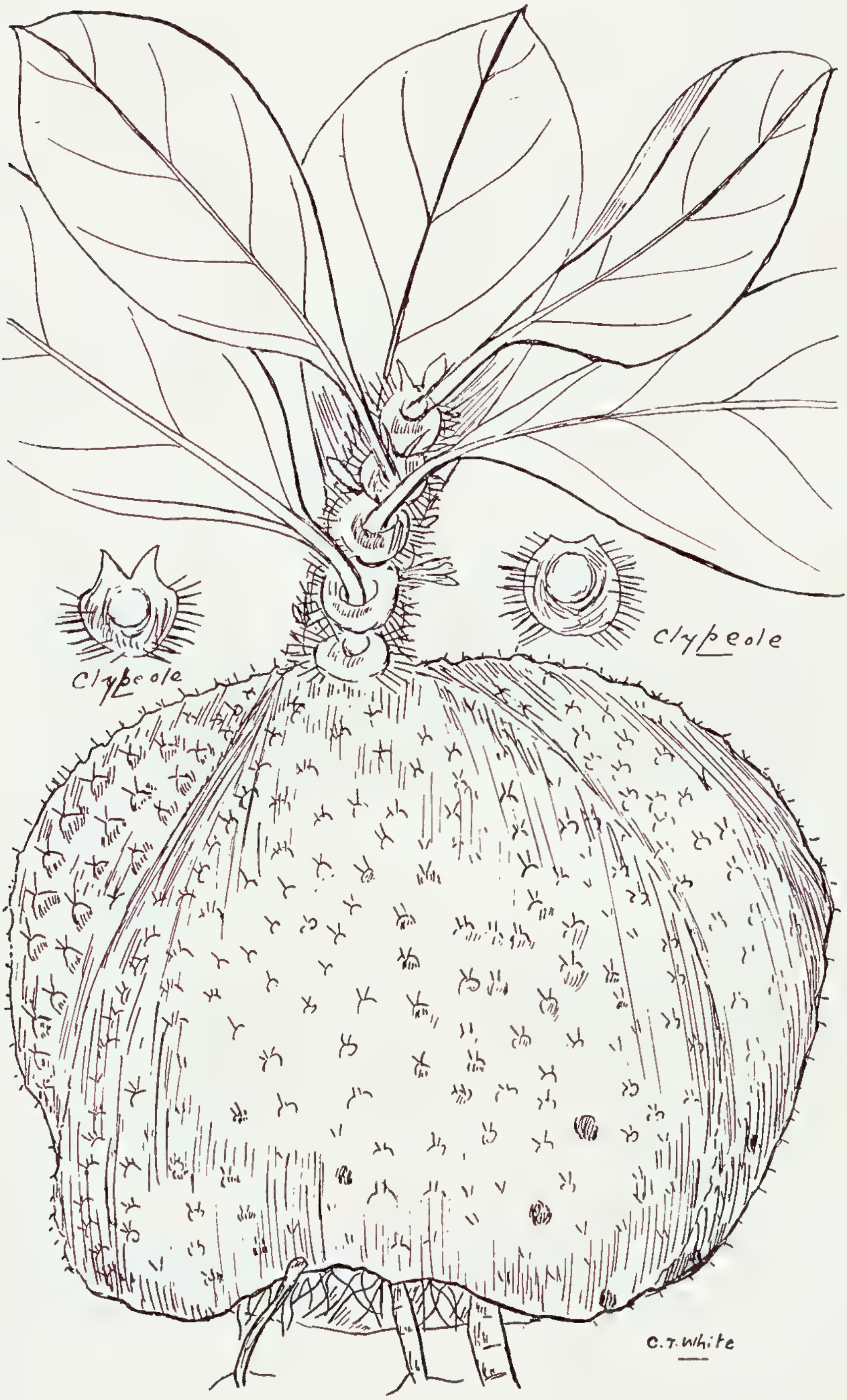
Asclepiadeæ—

Sarcostemma australe, *R. Br.* Mabuiag Island.
Dischidia nummularia, *R. Br.* Moa Island.
Dischidia ovata, *Benth.* Darnley Island.
Dischidia Rafflesiana, *Wall.* Moa Island. This is the species which forms the large masses of pitchers (Ascidia).

Convolvulaceæ—

Ipomæa paniculata, *R. Br.* Yama Island.
Ipomæa erecta, *R. Br.* Bountiful Island.
Ipomæa urceolata, *R. Br.* Darnley Island.
Evolvulus alsinoides, *Linn.* Coconut Island.

Plate XVIII.



MYRMECODIA ANTOINII, *Becc.*

Solanaceæ—

Solanum viride, *R.Br.* Yama Island.

Scrophularineæ—

Buchnera linearis, *R. Br.* Peak Point, Cape York.

Bignoniaceæ—

Tecoma australis, var. meonantha, *Bail.* Cape York.

Pedalineæ—

Josephina grandiflora, *R. Br.* York Island.

Acanthaceæ—

Acanthus ilicifolius, *Linn.* Saibai Island.

Myoporineæ—

Myoporum acuminatum, var. angustifolium. With a prominent glandular inflorescence similar to specimens collected on Sweer's Island a few years ago by *J. F. Bailey.* Mornington Island, *Bick.*

Verbenaceæ—

Clerodendron floribundum, *R. Br.* Yama Island.

Labiatæ—

Tribe Stachydeæ.

LEONOTIS, *R. Br.*

Calyx-tube long, narrowly funnel-shaped, 8 to 10 ribbed; teeth 8 to 10, spine-pointed, the upper much the largest. Corolla arching, twice as long as the calyx, deeply bilabiate; upper lip oblong-spathulate, convex, entire; lower shortly three-lobed. Stamens 4, included; anthers all 2-celled, the cells divaricating, acute at both ends. Nucules trigonous, with a cup-like concavity at the apex. Herbs with the flowers in very dense distant whorls bracteated by large leaves. Natives of Tropical and South Africa.

L. nepetæfolia, *R. Br.* Annual plant, 3 to 6 ft. high, with finely puberulent square stems. Leaves long-petiolate, ovate, membranous, inciso-crenate, 3 to 4 in. long, cuneate at the base. Flowers 100 or more, in very dense distant whorls 3 to 4 in. thick. Calyx ¾ to 1 in. long, all the teeth pungent. Corolla twice as long as the calyx, densely coated with bright scarlet pubescens, the lower lip half as long as the upper, the tube with three rings of colourless hairs inside below the insertion of the stamens. *Phlomis nepetæfolia,* Linn; *Leonotis ovata,* Bojer.

Hab.: A cosmopolitan weed of tropical countries; now met with at Peak Point, Cape York, by *E. W. Bick.*

Amarantaceæ—

Deeringia celosioides, *R. Br.* Yama Island.

Chenopodiaceæ—

Tecticornia cinerea, *Benth. and Hook.* Mornington Island.

Proteaceæ—

Hakea arborescens, *R. Br.* Mornington Island.

Thymelæaceæ—

Pimelea cornucopiæ, *Vahl.* Badu Island.
Phaleria Blumei, var. latifolia, *Benth.* Yama Island.

EUPHORBIACEÆ—

Euphorbia atoto, *Forst.* Nagi Island.
Euphorbia Mitchelliana, *Boiss.* Peak Point, Cape York.
Euphorbia schizolepis, *F. v. M.* Mornington Island.
Euphorbia Macgillivrayi, *Boiss.* Bountiful Island.
Euphorbia eremophila, *A. Cunn.* Nagi Island.
Euphorbia heterophylla, *Linn.* Very abundant on Murray Island. A South American plant. All the above species are injurious to stock.
Breynia stipitata, *Muell. Arg.* Darnley Island.
Petalostigma Banksii, *Britt. and S. Moore.* Mornington Island.
Antidesma parvifolium. *F. v. M.* Mabuiag Island. The currant-tree of Barron River.
Codiæum variegatum, *Blume.* Stephens Island.
Acalypha sp. Stephens Island.

URTICACEÆ—

Ficus pilosa, *Reinw.* Saibai Island.

CYCADACEÆ—

Cycas sp. Bountiful Island. Only seeds obtained.

ORCHIDEÆ—

Dendrobium bigibbum, *Lindl.* West Island.
Dendrobium superbiens, *G. Reichb.* West Island.
Dendrobium undulatum, *R. Br.* Woody Island.
Dendrobium Johannis, *Reichb.* West Island.
Dendrobium Smilliæ, *F. v. M.* Moa Island.

SCITAMINEÆ—

Costus Potieræ, *F. v. M.* Moa Island.

AMARYLLIDEÆ—

Crinum sp. Wai Weir Island. Only bulbs obtained.
Calostemma album, *R. Br.* From Mr. E. W. Bick's description of a dried broken portion of plant which he found on the ground over the spot where he obtained a few bulbs, which, from his description of the leaf fragment and the general appearance of the bulbs collected, it is hoped that the above plant may have been rediscovered after having been sought for during the past hundred years. Dr. R. Brown gave "Turtle Island" as the habitat of his plant, and the present bulbs have been obtained on "Bountiful Island," which might in Brown's day have borne the name of "Turtle Island" from the large number of those animals always, even at present, seen there.

LILIACEÆ—

Dracæna angustifolia, var. Honoriæ, *Bail n. var.* (After Honor Cecilia Paget, the granddaughter of His Excellency Sir William Macgregor, our esteemed Governor.) This variety differs only from the normal form in having its leaves margined with white. The cuttings now growing in the Brisbane Botanic Gardens were brought from Stephens Island by *E. W. Bick.*
Dianella ensifolia, *Red. Lil.* Badu Island.
Tricoryne platyptera, *Reichb.* Badu Island.

COMMELINACEÆ—

Cyanotis axillaris, *Rœm. and Schult.* Moa Island.

JUNCACEÆ—

Xerotes Banksii, *R. Br.* Moa Island.

RESTIACEÆ—

Restio gracilis, *R. Br.* Badu Island.

CYPERACEÆ—

Fuirena umbellata, *Rottb.* Mornington Island.

GRAMINEÆ—

Eriochloa punctata, *Hamilt.* Wai Wair Island. Early spring grass.
Panicum leucophæum, *H.B. and K.* Mapoon.
 argenteum, *R. Br.* Moa Island.
 helopus, *Trin.* Mabuiag Island.
 trichoides, *Sw.* Murray Island.
 melananthum, *F. v. M.* Mabuiag Island.
 marginatum, var. strictum, *Benth.* Badu Island.
 effusum, *R. Br.* Mapoon.
Spinifex hirsutus, *Labill.* Yama Island.
Setaria glauca, *Beauv.* Badu Island. Pigeon grass of America.
Cenchrus autralis, *R. Br.* Nagi Island, Hillside burr grass.
Cenchrus elymoides, *F. v. M.* Coconut Island.
Thuarea sarmentosa, *Pers.* Saibai Island. Running beach grass.
Perotis, rara, *R. Br.* Moa Island.
Polytoca cyathopoda, *Bail.* Mabuiag Island.
Pollinia argentea, *Trin* Badu Island.
Heteropogon contortus, *Rœm, and Schult.* Darnley Island. Bunch spear grass.
Heteropogon insignis, *Thu. Enum.* Mabuiag Island. Tall spear grass.
Chrysopogon Gryllus, *Trin.*, var. pallidus, *Benth.* Wai Weir.
Chrysopogon elongatus, *Benth.* Mapoon.
Sorghum plumosum, *Beauv.* Peak Point, Cape York.
Sorghum fulvum, *Beauv.* Moa Island.
Anthistiria ciliata, *Linn.* Murray Island. Common kangaroo grass.
Anthistiria frondosa, *R. Br.* Peak Point, Cape York. Leafy kangaroo grass.
Eriachne stipacea, *F. v. M.* Peak Point, Cape York.
Eriachne squarrosa, *R. Br.* Badu Island.
Eriachne glauca, *R. Br.* Mapoon.
Eriachne pallescens. Badu Island.
Eriachne melicacea, *F. v. M.* Fragm., v., 205; Benth. Fl. Austr., VII., 631. (Plate XIX.) A slender, erect, tufted, highly fragrant grass equalling the "scented vernal-grass"; height, from $1\frac{1}{4}$ to 2 ft. Stem and leaves sprinkled with shortish, spreading, slender hairs arising from bladder-like tubercles. Leaves narrow, with subulate points, 2 to 4 in. long, sheaths loose. Ligula prominent, ciliate; nodes not bearded. Panicle of raceme-like branches bearing from 3 to 6 or sometimes more pale-coloured pedicellate spikelets. Outer glumes glabrous, acute, rather rigid, about 3 lines long; flowering glumes not exceeding them, the margins densely ciliate with long spreading hairs; the back as well as the palea glabrous, except at the base, or sprinkled with very few hairs.

Hab.: Moa Island, *E. W. Bick.* I cannot find that Baron Mueller has mentioned the powerful fragrance of this grass, but, if not, this Queensland form might be known as *E. melicacea var. fragrans.*

GRAMINEÆ—*continued.*

Chloris barbata, *Sw.*, var. decora, *Benth.* Darnley Island.

Eleusine aristata, *Ehrenb.* Nagi Island. A useful grass for growing under trees; has much the habit of the common couch.

Phragmites communis, *Trin.* Nagi Island. Common reed of most countries.

Eragrostis interruptus, *Beauv.* Peak Point, Cape York. Love grass.

Eragrostis Brownii, var. pubescens, *Bail n. var.* (Plate XX.) Stems procumbent, very slender and long; the leaf sheath and blade, rhachis, and rhachilla clothed with scattered spreading hairs, most numerous at the orifice of leaf sheath. Leaf blade narrow, 2 to 7 in. longg, more or less flat, about 2 lines broad. The panicles in form somewhat resemble those of *E. speciosa,* attaining a length of 2 ft., bearing as many as 14 branches, which vary from 1 to 3½ in. long, bearing 6 to 14 spikelets about 6 lines long, ¾ line broad, with from 8 to 12 flowers in each row; the margins of glumes scarious and tinted like most allied plants.

Hab.: Cairns, *F.M.B.*, 1897. Badu Island, Torres Strait, *E. W. Bick.*

Eragrostis Brownii, *Nees*; var. York Island.

Eragrostis speciosa, *Steud.* Badu Island.

Triraphis mollis, *R. Br.* Badu Island.

Triraphis pungens, *R. Br.* Peak Point, Cape York.

FILICES—

Schizœa dichotoma, *Sw.* Peak Point, Cape York.

Polypodium quercifolium, *Linn.* Darnley Island.

COPRA DRYING.

In "Tropical Agriculturist" for November, 1910 (vol. xxxv., No. 5), Mr. J. C. Willis gives an abstract of an article on the drying of copra published in "Der Tropenpflanzer." It is stated that a mould and darker colouration are caused from the fact that the kernel of the freshly opened nut is wet with cocoanut milk. Consequently, the first stage of drying requires a fairly high temperature, about 60 deg. to 70 deg. C. or higher. After the outer moisture has disappeared and the flesh is a little dried the temperature may be lowered to 50 deg. and maintained at this until the copra is at least half dry. Then the temperature must be raised again to remove the last moisture and the copra must be cooled in an airy room. Artificial heat is preferable to sun heat and leads to a desirable uniformity in the sample.

Copra drying should be undertaken immediately after the opening of the nuts and should be finished in twenty-four hours.

Results of experiments in New Guinea show that 4,438 nuts gave a ton of copra, and freshly cut kernels gave 62.7 per cent. of dry copra.

Plate XX.

Eragrostis Brownii, *Nees*, var. pubescens, *Bail.*
A: *a*1, Base of leaf; *a*2, Ligula; *a*3, Top of leaf sheath. B: *b*1, Base of leaf; *b*2, Top of leaf sheath; C: Spikelet. D: Rhachis of spikelet and outer glumes.

Tropical Industries.

THE LATEST COTTON-PICKING MACHINE.

In the June number of this journal we gave some account, with illustrations, of the Angus Campbell cotton-picking machine, which has taken twenty-five years to bring to the state of perfection at which—according to the undoubted testimony of such men as Herbert E. Walmsley, then president of the New England Spinners' Association; Arthur Hammerslag, of the Carnegie Technical Schools of Pittsburgh; Percy Freeman, the Dallas agent of Alexander Eccles and Co., the English cotton-buying house—it has triumphantly arrived. After seeing it at work in the field, Mr. Walmsley, who attended the final trial as a sceptic, came away thoroughly convinced that, at last, a perfect machine had been evolved. He said: "After having seen the machine in operation, after having seen the actual results accomplished by this particular cotton-picker, and after carefully and thoughtfully studying the matter. . . . I am convinced the machine must and will rank in the future with such inventions as the gin, the sewing-machine, or the drawing and spinning frame. The rapidity, the ease, and the self-evident perfection with which the machine does the work were to me a revelation, and must, in my judgment, prove to be a revolution in cotton-picking."

Mr. Freeman, above mentioned, who is not a demonstrative person, pronounced it a success. He had counted stalk after stalk with 14 or 15 opened bolls, and every one was picked. He then wrote to his firm in Liverpool, and they, in turn, cabled that they would like to become interested in the machine.

In the words of a writer in "The World's Work," December, 1910:—"The death knell of the annual cotton-picking upheaval in the South has been sounded. . . . . The average field hand can pick between 200 and 250 lb. of seed cotton a day, although fast pickers often get as much as 400 or 500 lb. The machine can cover 8 or 10 acres a day. In a good field it would pick 8,000 or 10,000 lb., and in a poorer field 4,000 to 5,000 lb. With it, a man could go over a 40-acre farm twice in ten days, and picking time would be the least busy time of the year."

The machine itself is a small, gasoline, traction engine, with two picking attachments swung under it and a pair of canvas bags hung out behind. It travels through the field as fast as a man walks, taking the cotton plant between the wheels, where it is picked over by almost countless steel fingers which catch the lint, but leave the plant uninjured, so that the later bolls may mature. Here it is that the machine triumphs. Not an unburst boll is damaged. To leave the unripe bolls has, until now, been the great difficulty in making a mechanical cotton-picker. Cotton cannot be gathered all at once, like wheat. Cotton bolls on the same plant mature and open progressively, making the problem of mechanically picking cotton extremely difficult.

A cotton-picking machine to be commercially successful must be able to pick the open bolls without injury to the unopened bolls and blooms or to the foliage and the plant itself. It must do this faster and at a lower cost than can be done by hand, and it must be able automatically and mechanically to discriminate between the ripe and unripe bolls. Further, as the cotton is not all ripe and open at the same time, it must be able to go over the same field and plants two or three times during

the season without injury to plants or bolls. At one of the demonstrations in Texas, a farmer followed it for a while, and then stopped still in the row and indulged in every ejaculation of surprise of which he was capable, profane and otherwise, winding up with:—

"Why, that thing looks like it was made to make sausage out of a live hog, and it's been over half a row of cotton and ain't hurt a plant."

THE PICKER A MONEY SAVER.

Still quoting the "World's Work," we are told that the machine will save the cotton farmer's money and temper. It will pick his cotton more cheaply than the hand pickers do, and it will not have to be begged to do so. Let us take, for example, a 100-acre farm producing half a bale to the acre. The machine can cover at least 8 acres a day. Its expenses would be approximately—

Wages in America.

	£	s.	d.
Driver	£0	6	3
Gasoline and oil	0	10	5
Boy	0	4	2
Repairs	0	4	2
Per day	£1	5	0

At that rate it would cost £15 to go over the farm once with the machine, and £30 to pick the 100 acres twice, which it could do in 25 days. To pick the 50 bales from this 100 acres by hand would cost between £100 and £160; and it would take more than twelve hands to complete the task.

From the saving of from £70 to £130 must be deducted the interest on and depreciation of the machine.

The mechanical cotton-picker is arranged so that the machinery can be taken off, and a plough, planter, harrow, or any other farm implement hitched to the 29-h.p. tractor. The price of the machine is £1,000.

HOW THE MACHINE WOULD AFFECT QUEENSLAND.

Now that there is some prospect of a forward movement in cotton-growing in Queensland, we may point out in what manner this successful machine would benefit the industry in this State. First of all, the cost of the machine has to be considered. At present the price is £1,000. There are, so far, no growers in Queensland who could afford to purchase such a machine; but, reasoning by analogy, there are no farmer growers of sugar-cane who could afford to pay £10,000 to £40,000 for a sugar-mill; yet we find in all our sugar-growing districts men growing from 10 to 50 acres of cane who make the industry pay them handsomely by means of the central or privately owned sugar-mills. The present cotton-growers own no cotton gins, neither did they in the palmy days of cotton-growing in Queensland; yet the small grower found it paid him to grow from 5 to 50 acres of cotton, because he could either sell it to the ginowners or have it ginned at a reasonable rate. What applies to the sugar-mill and the cotton-ginnery will apply with equal force to the cotton-picker.

It may also be cited, as an instance of the employment of expensive machinery, that, although individual wheatgrowers may not be able to purchase their own threshing machines, not cultivating vast areas of wheat, yet they derive a certain amount of profit by growing small areas and having it threshed by owners of threshing machinery. The growers in a cotton district could either combine to purchase a picker, or a capitalist could, on the assurance of a certain area being laid down in

cotton, be induced to purchase a machine and pick all the cotton in the district.

The main question to be answered is—Would it pay the grower to have his cotton picked by the machine, and would it pay the machine-owner to pick it at such a price as would enable the grower to realise a good profit from his crop?

As we took a 100-acre farm and a half bale (200 lb. lint, equal to 600 lb. seed-cotton) crop as an example of the cost of picking the crop by machinery, we will consider the same area as being picked by hand. In twice picking, by the former method, the cost is set down at £30 to pick 600 lb. seed cotton per acre on 100 acres; that is to say, that 60,000 lb. of cotton are picked for £30. By hand, the cost of picking in the United States is 1 dollar 10 cents. per 100 lb., or about ½d. per lb. This is the price paid in Queensland. Hence 60,000 lb. would cost £125 to pick by hand, as against £30 by machine, not to speak of the vast saving of time and labour. The cotton-grower within reach of a machine would have nothing to do with this crop at picking time, and would, therefore, be at liberty to attend to other work, which, under the hand-picking system, would have to be neglected or additional labour would have to be employed. The capabilities of cotton-growing in Queensland are enormous, and the advent of this machine should prove an incentive to farmers all over the cotton districts to plant as many acres of cotton as possible, with a view to making the State what it can easily become—the greatest cotton-growing country in the world without employing a single coloured labourer.

THE GERMINATION OF HEVEA SEEDS.

If the planting of Pará rubber is, in the near future, to be undertaken on a larger scale than at present, as we hope and believe it will be, not only in Tropical Queensland, but also on the rich tropical lands of all the Northern portion of Australia, it will behove planters to be very careful as to the seed they obtain. Serious losses have occurred in Papua owing to the non-selection and faulty packing of seed imported from Ceylon and other places. The writer lately saw a consignment of 500,000 Hevea seeds unpacked on a Papuan plantation, and practically the whole lot were useless. The following article from the "Agricultural News," Barbados, should be read and remembered by intending importers of rubber seed:—

"It has been found that the seed of *Hevea brasiliensis*, which has been imported from time to time for use in Grenada, has shown very unsatisfactory germinating power, and, in view of the cost of the seed, it was considered expedient by Mr. G. G. Auchinleck, B.Sc., Superintendent of Agriculture, to make observations on seeds grown locally, for the purpose of deciding as to what the low percentage of germination might be due. The results of Mr. Auchinleck's investigations have been presented by him in the form of a report, from which the following information is taken. They show that experience in Grenada is confirmatory of that which has been described already from other parts of the world.

"Mr. Auchinleck points out that the low germinating power of imported seed is obviously due to actual sterility of the seeds, to their rapid deterioration after maturity, or to both causes acting at once. For the purpose of obtaining information in regard to the suggested deterioration, seeds from capsules which had been opened just before dehiscence took place were planted twenty-four hours after the fruits had been plucked, a few being kept, however, for three days. The number of seeds

collected altogether was 975, and 160 of these were set aside as being too light. That there is a great difference in weight between the heavy and light seeds is shown by the fact that 100 of the former were found to weigh 16 oz., while the weight of the same number of light seeds was only 6 oz.; there was, however, no observable difference in size between the two kinds.

"In the continuation of the experiment, all the light seeds were planted in a bed, while of the heavy, eighty were sown at stake and seventy-five in pots. None of the light seeds germinated; of the heavy, nineteen of those at stake, and thirteen in pots, gave sprouts. These results appear to justify the rejection of light seeds when those of Hevea are being selected for planting.

"Observations on the rapidity with which the seeds lose weight, together with the consideration that from two weeks to several months are required for germination, led to the supposition that the rate at which heavy seeds become lighter in the soil might result in a serious diminution of their power to germinate, before the young plant has had time to pierce the hard seed coat. This led to the following experiment, undertaken to find how quickly heavy Hevea seeds may lose weight:—

"For the purpose, ten heavy seeds were packed in thoroughly dried charcoal, in a flask; while ten others were placed in a flask open to the air. Each lot was taken periodically from its flask at the same time, and weighed, with the following results:—

Day of Weighing.	Seeds in Air, Grams.	Seeds in Charcoal, Grams.
1st	48.8	49.0
5th	48.5	43.5
9th	47.0	40.5
15th	45.5	38.7
20th	44.4	38.0
25th	43.0	37.5
30th	41.8	37.2
42nd	39.0	37.0
49th	38.0	37.0
54th	37.5	37.0

Calculation of the results shows that in two weeks the seeds kept in air had lost 6 per cent. of their weight, and those in dried charcoal 20 per cent., the latter being about the extreme limit of desiccation; the light seeds took fifty days to reach this.

"Further observations, made for the purpose of ascertaining the cause of the decrease in weight, gave negative indications that this is due to the loss of water; and it is thought that it takes place on account of the presence of a definite ferment in the seed.

"The fact that the trials were commenced late in the bearing season make it impossible to ascertain if the poor germinating power is the indirect result of some imperfection in the flower, or irregularity in fertilisation. It was noted, however, that the embryos of all the seeds examined appeared to be normal, and there was the interesting observation that, out of about 320 capsules, all were trilocular and three-seeded, except two, which possessed four loculi and four seeds. The seeds in the abnormal capsules were subjected to a germination test, and three out of the eight gave sprouts. Attention is drawn to the faint possibility that a tendency toward irregularity in the floral organs of *Hevea brasiliensis* is

indicated, with the consequent production of a low germinating power in the seed that is eventually borne. The improbability of the correctness of such a suggestion is, however, pointed out.

"The final conclusions from the investigations are given as follows:—

(1) Seeds of *Hevea brasiliensis* lose weight rapidly after maturity, the loss being apparently due to desiccation;

(2) The loss of weight appears to coincide with loss of germinating power;

(3) Desiccation apparently takes place, in some instances, even before dehiscence of the capsule;

(4) Probably, without special precautions, Hevea seeds will lose their germinating power within two or three weeks after the ripening of the capsules.

The matter of practical importance that can be deduced from these results is that no Hevea seed should be sold until it has been selected rigorously by weight, and there is the additional indication that no unnecessary exposure or loss of time in planting should be allowed after the seeds have been received."

RUBBER AND COCOANUT PROFITS COMPARED.

The Klanang Produce Company issues statistics as to the production and sale of rubber and cocoanuts secured from its estates. The profits per acre over six-year-old rubber were as follows:—

—	Per Acre, Average Yield.	Cost per Lb.	Average Price.	Profit per Lb.	Profit per Acre.
	Lb.	s. d.	s. d.	s. d.	£ s. d.
1908	349·74	1 8	4 0	2 4	40 16 0
1909	630·88	1 3½	7 0½	5 9	181 7 6
1910	741·22	1 3	6 6¼	5 3¼	196 17 8

The cost of production would be lower but for the inclusion of areas in only partial bearing. Comparing these results with the cocoanut profits set out below, it will be seen that, although the tendency is towards higher yields, the growing of nuts is a poor industry compared with rubber planting:—

COCOANUTS.

—	Average Yield per Acre.	Cost per Ton.	Price per Ton.	Net Profit per Ton.	Profit per Acre.
	Cwt.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1908	10·83	9 2 7	13 10 0	4 7 5	2 7 0
1909	10·06	8 3 4	17 6 1	9 2 9	4 11 1
1910	10·16	8 17 5	20 12 4	11 14 11	5 19 2

The profits per acre are also from trees over six years old. It would appear that cereals, spices, and other catch crops are generally more remunerative than cocoanuts; but rubber, as the "Financial Times" says, is king over all for big profits.—"Rubber World."

Vegetable Pathology.

DISEASES OF THE PRICKLY PEAR.*

BY HENRY TRYON, Vegetable Pathologist.

INTRODUCTION.

In submitting this Report it may be pointed out that the writer has already made two Prickly Pear Diseases, that are to be met with in Queensland, the subject of investigation, and his brief memoir thereon—entitled, "On Two Prickly Pear Affections"†—may be tendered for concurrent consideration. However, it may at least be mentioned that neither of these maladies—the one physiological, and the other parasitic—appear to be ones that are operative to any extent in destroying the growing plant, much less are they ones that can be readily propagated artificially or be induced to spontaneously disseminate.

It will be, therefore, necessary to consider those diseases associated with the Prickly Pear Plants of other countries, and, insomuch as there are grounds for concluding that those that victimise these plants affect them generally without regard to species, all of those that have been mentioned as being Opuntia diseases will here be regarded as ones to which our Queensland pest may become liable or be subjected to.

1.—PRICKLY PEAR ROT.

In Sicily a Prickly Pear Disease of some severity has been met with in the district of Catanzaro, that has been described by Professor Luigi Savastano‡ under the term "Il Marciume," that we should designate "The Rot." It has also been—as we learn from this author—the subject of brief observation by S. Biuso.§

This malady is said to be injurious to the *Opuntia Ficus India*, and to affect the entire plant. In the roots it advances rapidly along the fibro-vascular bundles, and then through the trunk and branches of the plant to the "palettes"; and, having invaded the latter, it involves their cellular tissue, that in consequence assumes an especially characteristic appearance, becoming transparent; but (adds Savastano) the most salient feature of this pathological affection is the formation of tubercles. Along the course of the fibro-vascular bundles groups of tubercles are met with, formed of transparent cells, covered externally with a tissue of thicker-walled ones that forms a kind of capsule. These tubercles are capable of being perfectly isolated, and are enclosed in the palette without any appearance of external swelling therein.

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* A Report tabled at a meeting of the Board of Advice on Prickly Pear Destruction, 13th June, 1911.

In 1910 the writer stated as follows :—"Useful Diseases. Prickly Pear (*Opuntia*). Knowing the extent to which the plants under consideration are injured by various diseases, the question of subjugating the notorious weed Prickly Pear (*Opuntia vulgaris* and other species), by some malady—one of parasitic nature especially, incidental to it, has long since been submitted by this office as one worthy of consideration. In the Annual Report of the Entomologist for 1898-9, it was already stated as under :—The matter of utilising a communicable disease that might spontaneously spread when once introduced, for the purpose of effecting the destruction of Prickly Pear (*Opuntia*), has engaged my serious attention. In addition to instituting some preliminary inquiry here, I have entered into correspondence, with this end in view, with foreign specialists as to the availability of a Prickly Pear malady that has been reported to be existent in some parts of the Mediterranean region."—Tryon, H.—Report of the Entomologist and Vegetable Pathologist, 1909-10, p. 10. Ann. Rep. Dep. Agr. and Stock, Qd., 1909-10.

† *Vid.*,—"Queensland Agricultural Journal," vol. XXI., pp. 143-7. Brisbane, 1908.

‡ Savastano, L.—"Note di pathologia arborea di L. Savastano."—"Boll. di Soc. di Natur. in Napoli," XI., pp. 110-111, 1897.

§ "Sul Fico d'India in Sicilia." Palermo 1879, p. 102.

Savastano further states that the disease is caused by a bacillus that produces in the tissue a neoplasm that contains colonies of it, and that by means of inoculations of these encapsuled bacilli pure cultivations of them may be obtained. Further, that he has inoculated palettes of *Opuntia Ficus India* growing in his district (Portici) with it, and has obtained a reproduction of the malady, but under defined conditions; the plants being healthy, inoculation does not produce any suspicion of disease. [" Le nostre piante essendo sane, l'inoculazione non può dare alcun suspelto di effezione precedente."]

This Opuntia affection does not present the usual characters of chlorosis, but a dry appearance; often the plants exhibiting it remain isolate. Even in the case of those grown at Catanzaro and also at Reggino, on steep slopes approaching the perpendicular, water does not serve to transmit it (through the soil). Perhaps—he adds—the diffusion—a very slow one—is due to the fact of multiplication by means of "palettes" from affected plants. In Sicily also, where the *Opuntia Ficus India* is grown in rows in good soil, the malady might prove destructive ("questo mal fra stage") relatively to the demands of culture. [Extent to which cultivation is carried on.—H.T.]

The inhabitants of Catanzaro have noticed the following phenomenon:—The affected plants remain weak at their bases, and, therefore, they are wholly overthrown on the soil, and then they are ruined. Some "palettes," however, remain healthy and develop new buds on their borders that can spontaneously root. It appears also—he concludes—that they place fresh plants at some metres distant from the old and destroyed trunks.

This disease, that resembles in many respects one that the writer has already investigated and described under the name "Sleeping Sickness ("Queensland Agricultural Journal," Vol. XXI., pp. 143-7, Sept., 1908), is, according to Savastano, non-injurious to other plants, and especially so to the members of the citrus tribe, olives, or figs.

2.—PRICKLY PEAR CANCER.

C. Sprenger described in 1901, in the briefest terms, as occurring in Southern Italy, another Prickly Pear disease, that he referred to as being very fatal. This, again, was found attacking the cultivated *Opuntia Ficus India.* He writes:—"The worst enemy, however, of it is the so-called "Krebs," a disease that occasions the rotting and decay of the entire plant, when this is not immediately discovered and eradicated and destroyed by burning" [Der schlimmiste Feind derselben aber ist der sogenannte "Krebs," ein Krankheit welche zu Faulnis und zum Absterben der ganzen Stocke führt, wenn sie nicht alsbald gefunden und ausgeschnitten sowie durch verbrennen vernichtet wird."*—Op. cit., p. 78.]

3.—LA GANGRENA BLANCA OF PRICKLY PEAR.

In Buenos Aires Prickly Pear plants are cultivated for fodder—amongst other purposes; but the success of this enterprise there seems again to be impaired by maladies affecting the Opuntias that are unknown to Australian experience.

Thus an anonymous Portuguese writer, in the "Cronica Agricola" for 1908, describes two in this connection—one "El Agusanamiento," due to insect attack; and another that he names "La Gangrena blanca" (White Rot.")

Regarding the latter, he states as follows:—"This is observed especially in spring, and appears as smaller or larger spots on the skin of the palettes; these spots are of a white colour, and, on removing the epidermis covering them, it is observed that the tissue is composed of a cottony substance, which is the fungus parasite—*Sclerotinia cactorum.*" [*Transl.*]

It behoves (adds this writer) the cultivator to frequently inspect his plants and gather all those parts that present the least symptom of *Gangrena*

* *Sprenger* (C.)—Kultur der Indischen Feigen in Süd-Italien. *Der Tropenpflanzer,* 5 Janr., 2 Feb., 1901, pp. 65-82.

blanca, and to remove and destroy immediately the plants that have yielded them.*

It is very evident, from the measures that this Buenos Aires writer prescribes for dealing with this disease, that it is one capable of producing marked injury.

4.—PRICKLY PEAR SCAB—*Phyllosticta opuntiæ*, Sacc. and Speg. (Sphæropsideæ).

This disease might be passed by as of little consequence were it not for the fact that it was referred to by two recent Italian writers on Plant Pathology—viz., Dr. O. Comes† and Dr. P. Voglino.‡

Moreover, C. Sprengel, already referred to, in connection with another Italian Prickly Pear Disease, states as follows:—"*Phyllosticta opuntiæ* injures the tender tissue of the joints, and can, under some circumstances, cause appreciable injury."§ [*Transl.*]

Dr. Comes quotes Briosi and Cavara to the effect that this parasite determines on the cladodia of *Opuntia Ficus Indica* spots, at first minute, circular, yellowish, that gradually dilate, and become confluent, on their external surfaces, somewhat raised, and that eventually determine a whitish or greyish colour. It is especially on the older cladodia that the spots are in greater number and more diffused. [B. and C.—*I Funghi Parassiti Fasc.*, 118, Feb., 1890.]

The writer, who is familiar with this fungus, regards it as one that has a marked effect in checking vegetative growth, when well developed.

5.—LEAF BRAND—*Phoma torrens*, Sacc.

F. Saccardo has described this Fungus-parasite as having been met with, on various Cactaceæ, in the Rome Botanical Gardens; and, concerning them, he informs us that it occasions the death outwardly of the part of the plant where it occurs—"quibus cutem mox urit et tandem mortem affert."||

6.—DOWNY MILDEW—*Phytophthora cactorum*, Libert & Cohn.

This fungus attacks the young seedlings of Cactaceæ, and is fatal to them.

However, its further consideration must be dismissed, since it exhibits similar injurious relationship to those of other plants, including the seedlings of several timber trees of repute. Full accounts of it and its habits are given by R. Hartig and by Ed. Prillieux.

7.—RUST—*Æcidium opuntiæ*, Mag.

P. Magnus described and figured, in 1898, one of the rust fungi as occuring in its æcidial condition on an Opuntia at Bolivia.¶

MINOR MALADIES.

Certain other Opuntia diseases, due to the attacks of fungus-parasites, may be also mentioned, although they are evidently not fatal ones:—

1. Black Spot Fungus—*Perisporium Wrightii*, B. & C. (Pyrenomycetes). D. Griffith, writing on the subject of "The Prickly Pear as a Farm Crop," mentions this fungus as injuring the plant.**
2. The Rot Fungus.—*Glæosporium Cactorum*—is described by J. F. Clark in 1906 in the "American Florist." (Op. cit., vols. 15, No. 611, pp. 841-2, fig. 1)

* *Anon.*—" La Tuna sin espinas—La forrajera de nuestras regiones aridas." "Cronica Agricola," Año 2, p. 147-8. (1908) Buenos Aires.

† Crittogamia Agraria, p. 53 (1891).

‡ Patalogia Vegetale, p. 232 (1905).

§ "Der Tropenpflanzer," 5 Jahrg. 2, p. 78 (1891).

|| Saccardo, F.—"Misc. Mycol.," p. 26, and "Sylloge Fungorum," vol. 3, p. 138.

¶ Magnus, P.—"Berichte de Deutschen Botanischen Gesellschaft," 1898, p. 151, 1 pl.

** Griffith (D.)—"The Prickly Pear as a Farm Crop," U.S.A. Depart. Agr. Bur. Pl. Indust. Bull. 124-7.

3. Black Wart Fungus—*Diplodia Opuntiæ*, Sacc (Sphæropsideæ). M. C. Cooke, writing in 1906 with reference to what he has observed regarding the occurrence of this parasite as affecting plants in cultivation in Europe, states as follows:—"The injury caused by this fungus is sometimes severe; the black wart-like outgrowths constituting the sterile portion of the fungus often covering a considerable area, the surrounding tissue becoming discoloured, &c.†

FUNGUS FLORA OF OPUNTIA SPP. ("PRICKLY PEARS.")

The subjoined list—that includes the names of those fungi ascribed to *Opuntia spp.* as Host Plants, by F. von Thumen (1887), G. Farlow and A. B. Seymour (1888 and 1891), and P. Sydow (1898), as well as the indications of other writers, may serve to guide the investigator in ascertaining the more or less effective causal agents of the diseases of those plants:—

Pleurotus opuntiæ, *Sacc.* [Agaricineæ].
Galera hypnorum, *Batsch*, [Do.]
*Æcidium opuntiæ, *Magnus* [Uredineæ].
*Phytophthora cactorum, *Lebert et Cohn* [Phycomyceteæ].
Aspergillus Africanus, *Dur. et Mont.* [Hyphomycetæ].
*Glœosporium cactorum [Melanconiaceæ].
*G. opuntiæ, *Ev. and Ell.* [Melanconiaceæ].
G. lunatum, *Ellis and Ev.* [Melanconiaceæ].
*Phyllosticta opuntiæ, *Sacc. et Speg.* [Sphæropsideæ].
*P. opuntiæ, *Sacc. et Speg.*, var microspora, Cav. [Do.]
Aposphæria fibrisequa, *Sacc.* [Do.]
Ascochyta opuntiæ, *Scalia* [Do.]
*Phoma mamillariæ, *Ell. and Ev.* [Do.]
*Phoma cacti, *Berk.* [Do.]
*Ph. torrens, *Sacc.* [Do.]
Vermicularia dematium (*Pers.*) *Fr.* [Do.]
Didymella opuntiæ, *Pat.* [Pyrenomyceteæ].
Monttacnella opuntiarum, *Speg.* [Do.]
Anthostomella cacti (*Schw.*), *Sacc.* [Do.]
*Leptosphæria sicula, *Sacc. et Beltr.* [Do.]
Perisporium Wrightii, *B. et C.* [Do.]
Chætomium montemartini, *Cav.* [Do.]
Didymosphæria opulenta (*De Not.*), *Sacc.* [Do.]
Sphæria cacti, *Schweinz* [Do.]
Nectria opuntiæ, *Roll* [Do.]
Nectriella jucunda, *Mont.* [Do.]
*Diplodia opuntiæ, *Sacc.* [Do.]
Rosselinia horridula, *Sacc.* [Do.]
R. appendiculata, *B. and V.* [Do.]
Sphærella opuntiæ, *Ell. and Ev.* [Do.]
Teichospora inverecunda, *De Not.*, var. rami, *Sacc.* [Do.]
Myiocoprion licatense (*Pass. et Bettr.*), *Sacc.* [Do.]
Giberella pulicaris (*Fr.*) *Sacc.* [Do.]
*Rhytisma cacti, *Schwein. f.* [Discomyceteæ.]
Beloniella Wagneriana, *Rehm.* [Do.]
*Sclerotium opuntiarum, *Speg.* [Mycelia sterilia.]
*S. cactorum, *Speg.* [Do.]
Stagonospora asphoteli, *Mont.*; cacticola, *Rol.*
Lembrosia brevis, *Tracy et Earle.*

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† Cooke (M. C.)—"Fungoid Pests of Cultivated Plants," *Gardeners' Chronicle*, Aug. 12, p. 135, fig. 1 (1905.)

Those fungi marked with an asterisk (*), are representatives of genera that include parasitec of plants additional to the Prickly Pear species, and that in these plants occasions specific diseases.

ETIOLATION.

This malady of Prickly Pear plants, characterised by diminished growth, thin and attenuated cladodia, and sickly yellow colour, attended by more or less unfruitfulness, has been frequently remarked by the writer as affecting Prickly Pear in Queensland when growing under special soil and climatic conditions. At times its occurrence is transitory and dependent on excessive leaching by rain of the nutrient soil elements for the time being otherwise available.

It is for the chemist to decide the question as to the possibility of inducing it artificially.

It may be of interest to point out that one of the earliest plant pathologists (Meyen) wrote of this affection in Cactus in 1841, as may be learnt from a quotation made by Hallier in the section of his "Phytopathologie," entitled, "Der Chemismus des Bodens" (Hallier, E "Phytopathologie," p. 100, 1868).

CONCLUSION.

The complete destruction of plants of any one kind or of related kinds—such as are the Prickly Pears—by disease arising from the parasitism of fungus organisms, is rarely realised in nature, even in the case of our cultivated plants, although certain of them—*e.g.*, the maladies occasioned by the downy mildews (Peronosporaceæ)—are often highly virulent. However, the fact that their attacks promote in some measure, and under certain circumstances, in the case of the Opuntiæ, destruction, or suspension, or retardation of growth, prompted the writer, already in 1899, to suggest that possibly parasitic diseases might be availed of as important subsidiary agencies in promoting the success of operations involving physical or chemical ones, especially since their work might be characterised by spontaneous dissemination when once they had entered the arena for its display.

In this respect the foregoing brief description of what is known regarding the Diseases of the Prickly Pear plants and of their fungus-parasites or fungus-flora, now for the first time summarised, is suggestive of a field of inquiry that this Board might—possibly with some profit to the final issue of its work—further cultivate. It appears, indeed, to be one especially indicated for research—in countries in which Opuntias are endemic or have been established or become naturalised—on behalf of its members, in view of th deficiency of our knowledge in most respects concerning it.

THE INSECT ENEMIES OF THE PRICKLY PEAR.*

By HENRY TRYON, Entomologist, &c.

I.—AUSTRALIAN.

In Australia the Prickly Pear (*Opuntia spp.*) experiences at present little or no injury from the attacks of insects subsisting wholly or partially upon it. There are, however, some members of this class related to it in the manner alluded to, and which, although of little significance in this connection, may be mentioned.

(1.) SUCKING BUG (*Nysius vinitor*, Bergroth) [Heteroptera, Family Lygæidæ].—This insect, that the writer has named the Australian "Chinch Bug," by reason of the affinity that exists between it and the notorious North American insect of that name, sometimes occurs in immense numbers on Prickly Pear in the south-western districts of Queensland. Such an occurrence was reported by the officer in charge of Border Customs as to

* A Report tabled at a meeting of the Board of Advice on Prickly Pear Destruction, 27th June, 1911.

be met with at Mungindi in November, 1901, and by Mr. A. L. Gillespie as experienced at Bullamon during the same month. This insect, in extracting the cell-sap on which it subsists, punctures the epidermis of the stem joints of the plant with its proboscis, and so occasions conspicuous superficial injury. It has even been reputed to kill it; but examples of Prickly Pear that have been submitted in evidence of this suggest, with respect to their condition, that death has been due to some cause other than insect-attack.

However, this plant-bug, that is a native insect, is not one to be encouraged—if the range of its occurrence and virulence of its depredation were not already determined by natural limits—since during the prevalence of dry weather, when it especially operates, it is harmful to many of our cultivated plants, attacking alike the fruit of vines, peaches, cherries, and the foliage of potatoes, cabbages, and cereals also.

(2.) Prickly Pear Aphis.—In the MacIntyre River district, and especially near Goondiwindi, the writer has remarked the presence of a special "Plant Louse" crowded on the young shoots and flower buds attached to the stem joints (*Cladodia*); but although it also feeds by suction on the cell-sap, as does the *Nysius* bug, no noteworthy injury appears to result to Prickly Pear plants from its attacks. The insect has, however, never been encountered in such numbers as often characterise the presence of the Aphides of other plants.

(3.) White Scale Insect.—(*Diaspis calyptroides*, Costa, *var. Cacti*, Comstock [*vid. postea*, p. 82]).

II.—EXTRA AUSTRALIAN.

(1.) The Wild Cochineal Insect (*Dactylopius spp.*).—In October, 1910, the writer, in a paper entitled "The Wild Cochineal Insect," with reference to its injurious action on Prickly Pear (*Opuntia spp.*) in India, &c., and to its availability for the subjugation of this plant in Queensland and elsewhere,"* adduced emphatic testimony regarding the injurious action, on the notorious weed under consideration, of insects referable to the genus *Dactylopius* of Costa (the *Coccus*, or *Pseudococcus* of certain other authors), —of insects to be ascribed possibly to more than one species of the same group. This had been remarked in countries outside Australia, and both in those in which the *Opuntias* were endemic and those to which they had been transferred and wherein they have since become naturalized; stress being especially laid on the exercise of this habit in British-India on the part of the Wild Cochineal Insect (*La grana silvestre*), a term applied to all other species of *Dactylopius* than *D. coccus* proper that yields the most highly-prized tinctorial commodity, spoken of as *La grana fina*; and, with regard to the Indian Peninsula and their occurrence there, historical records were also cited in support of the statement that this relation between insect and plant had been formerly availed of, by the officials of the governing body there, as a means for effectually subduing Prickly Pear plants, when they had already overrun extensive areas, as has happened since in Australia.

In the memoir (*vid. op. cit.*, p. 190) above alluded to, it was stated by the writer also, that a Wild Cochineal Insect (or *Grana silvestre*) had been introduced to the Cape of Good Hope in 1832, *viâ* Hamburg, through the hands of its local Resident, Baron Ludowigne; also, that it showed a marked preference for *Opuntia vulgaris*, Miller. (*Cactus opuntiæ*, Linn.) [The common Queensland plant, according to the Colonial Botanist (F. M. Bailey, C.M.G., F.L.S., &c., whose determination, however, is at variance with that arrived at by Mr. H. Maiden, Government Botanist of New South Wales]. There are good grounds for concluding that a Wild Cochineal Insect still exists in this part of the world, although testimonies with regard to the injuries that it occasions to its food plants are apparently conflicting.

* "Queensland Agricultural Journal," Vol. xxv., No. 4, p. 188-197, Oct., 1910.

Thus Mr. Thomas O'Hagan informed the writer, early during the present year, that in the Port Elizabeth district there grew two wild *Opuntias*, one of which seemed to be identical with the more prevalent Queensland exotic, and that this *Opuntia* there was victimised by a kind of Mealy Bug or Cochineal Insect that actually in some cases destroyed it.

On the other hand, the well-known investigator, Chas. P. Lounsbury, the Govt. Entomologist of the Union of South Africa—writing on December 16th, 1910—states that a wild Cochineal Insect still occurs there, and that also a Prickly Pear, named by the Kew authorities *Opuntia monacantha*, is a pest species; whilst in South Africa, too, there is a second *Opuntia*—"common about the towns on waste lands, a high-growing, scraggy form with rather thin concave leaf-joints"—that has not been definitely identified, but that he has grounds for concluding is not *Opuntia vulgaris*, as the authorities cited by the present writer had suggested. Lounsbury further adds, with regard to the wild Cochineal Insect and its occurrence, that he has never seen it on *O. monacantha* even when he has observed it on the second species growing in its vicinity, and that, though it infests the latter, it does not kill it. ["*I do not recall ever having seen a plant of the scraggy sort free of the wild Cochineal, yet I have not ever seen one of the plants killed by the insect.*"—C. P. Lounsbury, *in lit.*, 16th December, 1910.]

Apparently, this action of the wild Cochineal Insect or Insects—for the writer has referred to at least four different kinds—is one for local inquiry in the original or adopted homes of these insects. It will, moreover, be necessary as the outcome of exact inquiry to ascertain to what extent they are victimised, and so their cacticidal activity lessened, by certain natural enemies; and amongst these may be mentioned the dipteron *Leucopis bellula*, Williston ("*Insect Life*," I., p. 258 [1889]), and the predatory Caterpillar, *Dakruma coccidivora*, Riley and Townsend (*l.c.*), amongst other of their foes.

Moreover, if there be grounds for concluding that parasites (these or others) or diseases prevent these wild Cochineal Insects from effectively destroying the Pear, then it should be our endeavour to devise a practicable means of rearing the insects free from the presence of such natural enemies before—if decided upon—transporting them hither.

Investigations such as are alluded to would involve visits—more or less prolonged—to India, South Africa, and the American Continents at least.

(2.) OTHER EXOTIC INSECTS.—Of other insects that subsist on Prickly Pears (*Opuntia, spp.*), the following may be mentioned:—

(*a*) The Mealy Bug (*Rhizococcus spinosus*) described by Kuhlgatz*;

(*b*) The White Cactus Scale Insect (*Diaspis calyptroides*, Costa, *var. Cacti*, Comstock).†

This insect has already become introduced into Queensland, and, though affecting other plants than the *Opuntias*, is restricted in its dietary to the Cactaceæ.

In February, 1902, the writer had occasion to write concerning it as follows:—

"The portion of *Cereus* submitted is attacked by one of the Scale Insects that bears the name of *Diaspis cacti*. This insect also victimises *Epiphyllum* and *Opuntia* (Prickly Pear) in the Brisbane district.

"In the United States of America the pineapple is also included amongst its food-plants. [*Note.*—This may be an error due to faulty identification of the insect occurring in injurious relation with the plant named.]

"With reference to its occurrence on Prickly Pear, I have observed that when this plant is growing under unsuitable conditions—*e.g.*, in a dry,

* "Monatsschr. für Kateenkunde," 8, 1898, No. 11, p. 166-170.

† Fernald (M.E.) states that *Diaspis calyptroides*, Costa (1835), is synonymous with *Aspidiotus echinocacti*, Bouché (1833), and that accordingly the name of the insect should be *Diaspis echinocacti* (Bouché). She moreover ignores the statement that it is a Pine-apple-loving insect and adds Europe, Algeria, Mexico and other localities to places where it occurs: distinguishing also two sub-species—*cacti* and *Opuntiæ*—"Catalogue of the Coccidæ," p. 229-30 (1903).

exposed situation—*Diaspis cacti* would hold it in check, and the same remark applies also, when it is associated with *Cereus* and *Epiphyllum*. The latter plant, indeed, I have destroyed through its instrumentality.

"Illustrations of its pernicious influence under the circumstances mentioned may be met with in the case of Prickly Pear in the cutting near the School of Arts, Brisbane, and in that of *Cereus* on a cutting near the New Farm road.

"In Brisbane, this Scale Insect is extensively preyed upon by a lepidopterous insect, and hence it may not exert its destructive influence to the extent that might otherwise happen were this absent.

"Some time since it occurred to me that it might be serviceable in Prickly Pear destruction, and accordingly, having reared some free from the presence of its enemy on *Epiphyllum*, I liberated it near Toowoomba. On a recent visit, however, to that district I was unable to find any trace of it.

"The Scale Insect (*Diaspis cacti*) is related to the White Scale of the rose; also to one that I discovered some years on peach, and which has proved especially destructive (to the latter plant) in the United States, &c., since. This is named *Diaspis amygdali*, Tryon."

In reference to its native home, it may be added that this insect appears to be prevalent throughout Southern Arizona, where it is said to occur not only upon *Opuntia fulgida*, *O. arborescens*, and *O. versicolor*, but also there on *Cereus eunacanthus* also. It, too, has been met with in Southern India whither, as has been the case with its occurrence here, it has also been introduced.

(*c*) NEWSTEAD'S CACTUS SCALE INSECT (*Diaspis opunticola*, Newstead, originally described from Demeraro, &c.).—This insect is closely related to the foregoing, being distinguishable therefrom, however, in possessing more prominent terminal lobes. [*Note.*—Kuhlgatz (already cited) has written on the Scale Insects of the Cactaceæ; and to this authority the reader may be referred for further facts.]

(*d*) THE BORER (EL AGUSANAMIENTO).—The editor of the official organ of the Department of Agriculture of Buenos Ayres, writing in 1908, describes what apparently is a serious insect borer of the Prickly Pear plant, under the name "El Agusanamiento," that lives within the leaf joints on cladodia, consuming the tissue and causing a tenacious malodorous fluid to issue through certain external wounds; and he adds that it quickly destroys the plants that it infests, counselling the removal from the field and the prompt burning of these when discovered.*

(*e*.) BEETLE BORERS (*Cactophagus spp.*)—The plants, again, are injured by beetles and their grubs, that are related to the ordinary grain weevils, and belong to the family of Calandridæ. Little can be ascertained regarding these and their habits. *Cactophagus validus* is not uncommonly met with (in Mexico) beneath decaying Prickly Pear leaves. T. L. Casey has published a synoptical account of the species of the genus.†

From this summary it will appear that the *Opuntia* insect fauna is not very well known. However, enough has been brought to light to suggest that it comprises more than one natural enemy that may be regarded as a formidable opponent to its growth.

* *El Agusanamiento*, que se observa especialmente en verano ; las pencas afectadas presentan llagas más ó menos grandes por las cuales suele á menudo èscurrirse un líquido podrido, viscoso, parduzco ; abriendo con un fierro la llaga, se encontrará en el interior de la penca un número más ó menos grande de hermosas orugas de una elegante mariposita de dos ó tres centímetros de largo, verdosas con pintas blancas y coloradas, las cuales devoran y echan á perder rápidamente el tunal infectado.

También para esta enfermedad el cultivador de tunas deberá recorrer con mucha frecuencia su plantío, cortando toda penca afectada, que recolectará con cuidado, para llevarla afuera del campo y someterla á la acción del fuego.—Anon., "Cronica Agricola," Ano 2, pp. 147-8, Buenos Aires, 1908.

† Casey (T.L.)—Coleopterological Notes, IV., "Annals N. York Academy of Sciences," August, 1892.

THE CAUSE OF BITTER PIT.

It has been reported to the Federal Minister for Customs that Dr. Jean White and Professor Ewart, of Melbourne University, are believed to have discovered the cause of bitter pit in apples. "Needless to say" (says "The Farmer and Settler," Sydney), "if the discovery proves upon investigation to have got at the root of the cause, it will be of inestimable value to the apple-growers of the Commonwealth. No definite announcement has yet been made, but it is stated that the disease is believed to be caused by certain spraying substances used by orchardists to destroy codlin moth. The theory is an interesting one, and, in the absence of the particulars on which the Victorian scientists base their conclusion, it is arousing considerable discussion.

"The Victorian Minister for Agriculture is apparently very sceptical about the reported discovery, and he has challenged Dr. White and Professor Ewart to submit their theory to an immediate test.

"In accordance with suggestions made by the Ministers of Agriculture at the Conference in March, it had been intended by the Federal Government to carry out an investigation extending over four years, at an annual cost not exceeding £2,000, the Commonwealth to bear half the cost and the States between them the other half. The Federal Minister for Customs has now intimated that, as it is reported that the nature of the disease had been made clear, and that a theory as to its cause had been formulated tentatively, he feels that the matter should be inquired into before the Commonwealth could agree to pay half the cost of another and independent investigation. He accordingly arranged for a small committee, including the chief inspector of fruit in a neighbouring State and a leading Tasmanian orchardist, to investigate the matter with the Director of Quarantine.

"This committee, as a result of its investigations of the statement made and evidence produced by Dr. Jean White and Professor Ewart. has reported that in its opinion the question of an independent subsidised investigation may reasonably be postponed for twelve months, and it appears probable this course will be adopted.

"Orchardists should note, however, that even if the theory proves to be correct, it will not follow that the use of such substances will need to be abandoned. Manufacturers may be able to modify their preparations in such a manner as to retain their advantages whilst minimising or obviating the disadvantage which, if the theory is correct, they at present possess.

Mr. W. J. Allen, Fruit Expert to the New South Wales Department of Agriculture, questioned on the announcement, said he was inclined to think that bitter pit was not the result of the action of spraying substances used by orchardists to destroy the codlin moth, inasmuch as the disease has occurred in apple trees which have not been so sprayed; nor is it peculiar to unpruned trees. Mr. Allen has found that, generally speaking, trees which carry heavy crops are less affected than those which bear a small or even moderate crop.

"Mr. McAlpine, Vegetable Pathologist in Victoria, thinks it is highly probable that the disease is the result of the method of pruning, the mode of cultivation, the nature of manuring, as well as the stocks used. He found that in some cases thorough manuring only tended to aggravate the disease.

"Mr. Williamson, late Government Inspector of Orchards in New Zealand, expresses the opinion, based on forty years' experience in fruit-growing and experimenting in regard to fruit diseases, that the Melbourne scientists are mistaken. He says that bitter pit is caused by a microscopic fungus, and has been common amongst apples in the Wanganui district, New Zealand, for fifty years. Spores of the fungus are capable of being

carried many miles, and drop upon fruit when packed. One contaminated apple will affect a whole case in three weeks. Mr. Williamson says that when the spores first appear on the surface of the fruit a certain proportion of Bordeaux mixture will destroy it, but after they have penetrated the fruit spraying is no use.

"Three Tasmanian scientists point out that bitter pit was known long before spraying was adopted at all.

"Mr. H. J. Rumsey, of Dundas, New South Wales, in the course of conversation with a 'Farmer and Settler' representative, expressed himself very sceptically regarding the reported Victorian discovery:—'The worst case of bitter pit I have experienced,' he said, 'was on a number of Sturmer Pippins; and this was before I ever used such a thing as a spray-pipe. The pit was extremely bad; indeed you could not have placed the point of a pencil on any spot on the apples without touching the disease, and, curiously, it did not become noticeable until the fruit was stored. Not having had much experience of fruit-growing at the time, I did then what I should not think of doing now—I grubbed the trees out. Later on, however, some of them started to grow up again from roots which had been left in the orchard, and these have since cropped and have been fairly free from the bitter pit, even without spraying having been practised.' "

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

Table Showing the Total Rainfall for each Month of the Year in the Agricultural Districts of Queensland.

Stations.	1910.							1911.					
	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.
North.													
Bowen	2·23	0·58	0·18	3·75	0·30	3·89	5·36	23·72	7·57	10 66	1·64	0·12	0·2
Cairns	6·59	Nil	3·59	1·34	1·67	7·27	11·59	34·49	27·43	35·35	52·31	2·08	1·44
Geraldton (Innisfail) ...	19·35	1·34	7·42	11·51	3·18	7·30	4·77	36·96	35·51	28·39	50·53	3·58	5·10
Gindie State Farm ...	2·65	1·45	Nil	...	...	..	3·87	11·69	4·15	2·29	0·29	0·29	Nil
Herberton	1·70	Nil	0·83	0·58	0·43	4·93	9·71	11·43	13·16	15·35	14·17	0·58	0·36
Hughenden	0·85	0·18	Nil	2·75	1·57	3·41	1·13	9·15	3·76	0·17	6·29	0·4	0·2
Kamerunga State Nurs.	Nil	...	3·39	...	2·06	...		...	23·08	...	52·23	151·0	...
Mackay	5·70	1·1	0·18	4·32	0·7	2·67	2·15	30·52	13·04	14 41	3·14	0·77	0·22
Mossman	...	...	1·91	2 90	3·17	10 36	19 91	32·76	21·95	71·64	37·10	1·44	0·33
Rockhampton	5·98	1·67	0·23	1·62	0·99	4·17	2·46	9·64	21·07	6 39	1·44	0·56	Nil
Townsville	1·05	0·33	0·3	3·34	0·11	2·53	6·77	25·40	19·24	4·24	3·02	0·7	0·11
South.													
Biggenden State Farm	5·25	0·92	0·28	...	2·36	4·59	5·96	10·37	7·34	6·25	...	...	...
Brisbane	6·74	0·39	...	2·72	3·27	2 49	13·99	10·30	5·84	4·69	0·88	0·90	0·9
Bundaberg	6·17	2·10	0·16	2·33	0·70	8·39	1·58	21·05	9·75	4·31	1·46	0·56	Nil
Crohamhurst	11·78	0·63	0·70	2·30	3·83	3·31	6·20	28·85	19·20	16·67	2·94	1·21	0·13
Dalby	6·06	1·42	0·64	2·11	3·96	4 09	3·29	8 08	2·24	3·20	0·76	0·91	Nil
Esk	4·74	0·58	0·23	4·65	3 41	3 84	7·53	11·90	6·04	3 54	0·99	1·90	Nil
Gatton Agric. College	5·05	1·99	0·60	...	3·60	2 85	6·84	12 03	3 98	2·80	1·38	0·58	Nil
Gympie	5·57	0·83	0·32	1·54	2·90	3·16	1·96	9·13	5·33	6 02	1·88	0·32	Nil
Ipswich	3·74	1·67	0·58	1·55	3·70	1·93	5·04	8·15	4·19	2·51	1·38	0·42	Nil
Maryborough	4·89	1·09	0·35	1·22	1·53	4·19	3·19	16·93	6·58	7·20	2·61	0·16	0·11
Roma	5·71	1·24	Ni	0·46	3 64	4·39	0·96	11·52	5·94	1·25	0·14	1·13	Nil
Roma State Farm ...	...	...	...	0·38	2 95	3·50	7·97	9·72	...	5·39	0·04	·02	...
Tewantin ...	15·08	0·76	1·34	1·52	3·17	7·71	8·25	20·84	8·50	18·11	1·78	0·57	0·22
Warren State Farm ...	1·88	...	...	...	0·45	...	...	...	11 75	3·17	...	...	Nil
Warwick ..	3·16	1·82	0·54	1·39	2·20	3·86	3·46	7·13	2 01	3·12	0·74	1·04	Nil
" Hermitage State Farm	...	1·73	0·39	...	...	...	...	...	...	...	...	...	...
Westbrook State Farm	2·77	...	...	...	2·98	..	4·44	5·26	3·90	1·76	5·50	0·79	0·1
Yandina	13·13	0·70	0·15	0·88	3·34	5·16	16·05	12·04	10·73	12·02	2·68	0·28	Nil

Note.—The rainfall data in this table are compiled from telegraphic reports, and must be considered a approximate only.

GEORGE G. BOND, Divisional Officer.

Chemistry.

SOME QUEENSLAND MANGROVE BARKS AND OTHER TANNING MATERIALS.

By J. C. BRÜNNICH AND F. SMITH.

While the tanning industry has assumed considerable importance in the State, there has to the present been no systematic exploitation of our resources of tanning materials, the supply of tanstuffs being almost wholly obtained from interstate or oversea sources. The magnitude of these importations and their origin are shown by the subjoined statement obtained from the Statistical Department for the year 1909, the most recent record available:—

IMPORTS OF TANNING MATERIALS INTO QUEENSLAND FOR 1909.

Source.	Australian Materials.	Other.	Value.	Value.
	Tons.	Tons.	£	£
New South Wales	364·6	32·1	3,788	303
Victoria	47·5	...	469	
South Australia	1,401·9	...	15,755	
Tasmania	180·4	...	1,677	
Western Australia	8·4	...	66	
Natal	25·1	...	220	...
Total	2,060	...	22,278	...

The principal material employed in leather manufacture in this State is South Australian wattle bark (bark of *Acacia decurrens* and *Acacia pycnantha*), of which the Southern State exported in 1909, principally to Australian tanneries, as large a quantity as 8,540 tons, valued at £65,000. Undoubtedly, to replace in Queensland tanneries imported tanstuffs by a material of local growth presents a field for commercial enterprise either in the turning to account native tanning materials, provided such be found acceptable in the industry, or in the cultivation of tan-bearing introduced or indigenous plants of recognised value. In the latter connection the example of Natal is instructive. Australian wattle (*Ac. decurrens* and *Ac. pycnantha*), introduced in Natal thirty years ago, had by 1907 yielded 23,700 tons of bark, valued at £270,000, for export. Indeed, so successful has the culture of wattle proved that the Natal bark has largely replaced the Australian article on Continental markets, and, valued for the lighter colours of the leather produced, threatens to enter into competition with it in the Australian tanning industry.

Among the tan-producing plants indigenous to Queensland are varieties of Acacia and Mangroves, the latter being extensively employed in Continental tanneries, though not locally regarded with favour on account of the red colour of the tannage, and, as we understand, to the harsh quality of the leather produced.

THE UTILISATION OF MANGROVE BARK.

Despite the former objection, however, it is stated by Paessler (Collegium. 1902 (40), 332, and Jour. Soc. Chem. Ind., 1903, XXII.; 36) that suitable leather can be produced by judicious mixture of myrobalans, oak-bark, and other tanning material; and it is in conjunction with these that mangrove bark has undoubtedly found large application. [See also Journ. Soc. Chem. Ind., 1904, XXIII., 123.]

The East African swamps furnished bark, amounting to 12,105 tons during 1904, chiefly to German and United States markets (Journ. Soc. Chem. Industry, 1905, XXIV., 298). Other sources of supply are Borneo, Java, Sumatra, the Malay Peninsula, and India. The imports of bark to American ports during 1909 amounted to a value of 250,409 dollars (£50,000), and, in addition, a considerable market exists for the manufactured extract or "cutch." R. R. Williams, in an article on "The Economic Possibilities of Mangrove Swamps in the Philippines" (Philippine Journ. of Sci., 1911, VI., 1, 45) describes varieties of mangrove, some of which occur in Queensland, and is of opinion that both bark and "cutch" could be readily placed upon the American and Australian markets.

We may express the opinion that, provided the objectionable colour and texture imparted by mangrove liquors can be obviated, the utilisation of mangrove in the tannery should be very largely extended.

Recently chemical methods have been described which appear to be successful in the modification of colour. The most successful bleaching agent is nascent hydrogen, conveniently generated from aluminium shavings and sulphuric acid. Nascent hydrogen, in conjunction with "nascent hydroxides of metals" generated by electrolysis, is employed in the process patented by Damkohler and Schmidt (Journ. Soc. Chem. Ind., 1910, XXIX., 365); and a non-electrolytic process consists in adding barium aluminate and clearing by after addition of sulphuric acid or sulphates.

Williams, who tested the last method, states (*loc. cit.*) that mangrove extract so treated gave an excellent light-coloured leather. The process of the Deutsche Versuchsanstalt fur Lederindistrie and H. Arnoldi (Chem. Abs. Amer. Chem. Soc., 1910, 4, 2588) makes use of the action of aluminium amalgam, but in the experience of Williams, who tested it on a small scale, it did not prove to yield as satisfactory a leather as the barium-aluminate process. It is probable that the working of one or more of these processes, according to the full specifications of the patentees, will prove successful on a commercial scale in producing mangrove liquor that will yield tannage of colour and texture acceptable to the leather trade. It may be accepted that the modification of colour of mangrove extracts on a large scale has been satisfactorily solved.

SOME MANGROVES FROM NORTHERN QUEENSLAND.

It is of interest to show that our Northern mangroves contain varieties that may ultimately prove valuable for export or the manufacture of "cutch."

Recently, at the instance of the Department of Agriculture, a collection of mangrove barks was made in Northern Queensland by a collector (Mr. R. Cockburn), instructed by Inspector W. Watt, of Innisfail, and these, together with a report upon the extent of their occurrence and habit of growth, have been submitted for botanical identification and analysis. The material of the report of Mr. R. Cockburn is as follows, the naming of the Colonial Botanist being given with the local designation:—

"An area extending from the Murray River to Point Cooper was inspected. On the Murray River, including Bedford Creek, there is estimated to be an area, comprising several varieties, of 600 acres of mangrove; on the Tully River, 400 acres; Hull, 1,200 acres; Clump Point, 20 acres; Muff Creek, 150 acres; Maria Creek, 500 acres; Liverpool Creek, 60 acres; Mourilyan, 1,500 acres; Johnstone, 30 acres; Cooper's Point, 100 acres.

"These areas consist chiefly of four varieties—

(1) Black Mangrove (*Rhizophora mucronata*, Lam.), together with *Bruguiera Blumii*, comprises 45 per cent. of total timbers; is found generally close to the edge of rivers, and stands up on a great number of roots before forming into the main trunk. The length of roots seems to be affected by the depth of submergence in the tide, and roots are also sent down from lateral branches forming an almost impenetrable thicket. The trunk of the variety reaches a diameter of 2 ft., the majority being 8 to 12 in., through, and is inclined to branch before reaching any considerable height, although occasionally a height of 30 ft. is reached before the first limb. The bark, especially on larger trees, is as thick as ⅝ in., and is not difficult to remove at the season of inspection (November). The weight of bark from the average tree should be about 170 lb., drying to 37 lb. weight, and some larger trees will yield 600 lb. of wet bark.

(2) Black Mangrove (*Bruguiera* (*Rheedii Blumii*), with *Rhizophora mucronata,* comprises 45 per cent. of total mangrove in these areas. The tree occurs generally some little distance from water's edge, and extends to limits of tidal influence, which is frequently half a mile from the river bank. The variety has no roots above the surface, a distinct advantage in collecting the bark, as there is no trouble in getting amongst it, and the ground on which it flourishes is generally firm. The bark resembles that of *Rhizophora,* but it is a little rougher; it is easily removed.

(3) Red Mangrove (*Bruguiera parviflora,* W. and A.), comprises 15 per cent. of total area. A tall straight tree with no surface roots or spurs, attaining a diameter of about 10 in. (average diameter 6 in.). The bark is thinner than those of (1) and (2), and for trees of size equal to the previous varieties would be 20 per cent. less in weight. It is easily stripped.

(4) Grey Mangrove (*Ceriops Candolleana*, Arn.) constitutes 20 per cent. of total area. A small tree not exceeding 20 ft. in height (average 8-12 ft.), and devoid of roots above the surface. It generally grows unmixed with other varieties, and sometimes densely, when the average diameter is 3-4 in.

The remaining varieties are not plentiful, comprising 20 per cent, of the mangrove area:—

(5) *Sonneratia alba*, Linn. A fair-sized tree, 12 in. in diameter, 30 ft. high, growing close to water. No surface roots or spurs, and the bark is easily removed. Is not plentiful.

(6) Cedar Mangrove, so called from colour of wood and bark. Not plentiful. Occurs in mangrove swamps.

(7) Milky Mangrove (*Excœcaria Agallocha*, Linn.) A fair-sized tree. Bark thin and hard to remove.

(8) White Mangrove (*Avicennia officinalis*, Linn.) is fairly plentiful, and attains a diameter of 12 in. It is, however, rather crooked and branching, and the bark very thin.

(9) *Lumnitzera coccinea*, W. and A. A small tree not occurring plentifully. Bark not abundant.

(10) *Lumnitzera racemosa*, W.A. Same remarks as (9).

(11) *Ægialitis annulata*, R. Br. A rarely occurring small tree, found near Dunk Island.

(12) Apple Mangrove (*Carapa moluccensis*, Lam.), commonly, though not abundantly, occurring on rivers carrying large quantities of fresh water. A fair-sized tree, but crooked and branching. Bark is thin, but strips well.

(13) Shrubby Mangrove. Small shrubby tree, 3 in. in diameter, 10 ft. high, growing densely at water edge. The bark could probably not be economically stripped.

With regard to the commercial stripping of the mangrove varieties, Mr. Cockburn writes:—"The quantity of wet bark which an ordinary man may get in eight hours of varieties (2) and (4) would be not less than 10 cwt., probably considerably more; and the work would not be very hard, though not very clean or attractive; £4 per ton, f.o.b. river ports would be a very fair price for dried bark in bags, at which white men could make good wages; and I should be glad to supply a few hundred tons at that price."

THE TANNIN CONTENT OF NORTH QUEENSLAND VARIETIES.

The varieties, of which samples of bark were submitted, were examined for the content of water-soluble constituents, tannin, and non-tannins. The estimation of tannin was made by two methods—that of the Official Association of Agricultural Chemists of America, representative of the "shake process" which is being largely adopted, notably by the International Association of Leather Trade Chemists, and by a "filter-

candle'' method, the modification of Drs. Maschke and Wollenstein, as accepted by the German Tanners' Association. The latter method has been largely used in the evalution of West Australian mallet bark.

The procedure of the "shake method" (Bull. 107, U.S. Bur. of Chem.) was followed, except that a slightly longer period (viz., 15 mins.) was found to be required for the detannisation of tannin of some samples, and that the dry lightly-chromed hide-powder of Merck was substituted for fresh-chromed and moist hide. The lower figures obtained for tannin by this method than by the filter-candle method will more nearly approximate to the "true chemical" tannin present; the higher figure we take as representing the maximum amount of substances taken up by hide by the physical process of "adsorption," which also occurs in the tan-pits, in addition to that chemically combined. We find that of the named varieties the barks of *Rhizophora macronata and Ceriops Candolleana* may be classed as rich or fairly rich in tannin. In *Rhizophora mucronata* Williams (*loc. cit.*) found, as an average of twenty analyses, 27.6 per cent. tannin (calculated in the water-free bark) with a maximum of 33.8 per cent. The variety has been found in India to yield as high as 29.5 per cent tannin on the air-dried bark (Agric. Ledger, 1902, I., 35), though there the composition varies widely. Indian analyses of *Ceriops Candolleana* show a maximum of 31.56 per cent tannin. The barks of *Bruguiera parviflora* and *Sonneratia,* as elsewhere, are found to be low in tannin content. *Excœcaria Agallocha* is poor in tannin; and *Bruguiera* (*Rheedii*) *Blumii* and *Carapa moluccensis,* from the one sample examined, are of only moderate richness. These varieties, as also the Cedar Mangrove, however, might be utilised in the manufacture of "cutch." A sample of Queensland mangrove bark examined at the Imperial Institute was found to contain 37.50 per cent. tannin (Bul. Imp. Inst., 1905, 2, 276-278). Our results—with maximum tannin content of 36.70 per cent. for *Rhiziphora mucronata*, 26.52 per cent. for *Ceriops Candolleana,* and 35.50 per cent. for an unnamed variety from Cairns—indicate that the North Queensland swamps yield barks which, though probably unable to compare with East African varieties, ranging to 50 per cent. tannin, on foreign markets, may in the future be locally utilised; and bark in considerable quantity that will prove profitable for the manufacture of commercial extract.

With regard to the comparative value of bark of large and small trees of a variety, it appears that that from large trees contains in most cases higher percentage of tannin. Williams, however (*loc. cit.*) points out that the age rather than size is the determining factor in tannin content. It has also been pointed out (Bul. Imp. Inst., 1907, 5, 344-352) that old branches, stems, and roots yield richer bark than young branches, and the bark of the stem is appreciably richer than that of the branches.

QUEENSLAND ACACIÆ.

Eight varieties from the collection of the Colonial Botanist have been examined. Our results, despite the fact that the barks had been kept some years in the collection, confirm the analyses published pre-

viously by Maiden ("Wattles and Wattle Barks," 1891). They yield in the majority of cases a very low percentage of water-soluble material, and are correspondingly low in tannin. The exception is *Acacia Falcata* (28 per cent. tannin). We have seen no previous analyses of the bark of this variety published. A sample of Queensland wattle bark does not compare favourably with the South Australian article.

MISCELLANEOUS TANNING MATERIALS.

At the request of the Colonial Botanist, a sample of bark of *Eugenia Francisii* was examined. Though low in tannin (10 per cent.), it would yield an extract that would probably be valuable from the light colour imparted to hide, should the bark be available in quantity.

A number of miscellaneous tanstuffs, submitted chiefly by a Brisbane tanner, have also been examined. From analysis we are of opinion that the commercial tanning materials imported are, in some cases, containing a relatively high proportion of non-tannins, not of high quality. Comparison of tan liquor in use with "spent tan liquor" indicates that a fairly complete exhaustion during the tanning process has been obtained. The analyses of "spent bark" are of considerable interest. It was found that the samples, when finely ground in the laboratory, still yielded to water (extracting finally at steam heat) 11.95 and 8.36 per cent. of soluble material, and 8.75 and 5.94 per cent. of tannin. The second sample, extracted with cold water, yielded 6.36 per cent. water-soluble matter and 4.72 per cent. tannin. The figures indicate a possible source of economy in the tanyard, and would direct attention to the more thorough exhaustion of raw material in the preparation of liquors. Whether the residual extractive matter would produce leather of inferior colour—*i.e.*, whether more exhaustive extraction will yield a higher proportion of undesirable colouring matter—is a question of further inquiry. Our results do not show an undue amount of non-tannins in the laboratory extraction.

REACTIONS OF TANNINS OF MANGROVES AND ACACIÆ BARKS.

The infusion of varieties of mangrove and acaciæ barks and the various barks under examination were treated with reagents usual in qualitative examination.

The reactions of the mangrove varieties are in accord with those described elsewhere for these barks, and distinguish them as containing tannin of the catechol or "non-bloom-producing" class. There is a coincidence in the reactions of the South Australian and Queensland grown wattles; and *Acacia Falcata* and *Acacia Stenophylla* probably contain an identical tannin. The reactions of the remaining Acaciæ and the barks of the pine variety are hardly distinctive. *Eugenia Francisii*, yielding blues or blue-black iron salts, and no precipitate with bromine water, contains, probably, a tannin of the pyrogallol or "bloom-producing" class.

ANALYSES OF MANURING MATERIALS.

I.—QUEENSLAND MANGROVE BARKS.

An. No.	Variety.	Location.	Moisture.	Matter Insoluble in Water.	Water Soluble Matter.	A.O.A.C. Methods.		German Tanners' Assoc. Methods.		Soluble Ash.
						Tannin.	Non-tannin.	Tannin.	Non-tannin.	
961	Black mangrove (*Rhizophora*	Large tree, Muff Creek ...	7·76	48·84	43·40	27·05	16·35	33·25	10·15	2·40
	mucronata, Lam.)			(49·04	43·20	27·30	15·90	35·48	10·72	)*
965	Ditto ditto ...	Small tree, Lidly ...	7·96	43·04	49·00	33·10	15·90	37·95	...	2·10
966	Ditto ditto ...	Large tree, Maria Creek	7·70	44·70	47·60	36·70	10·90	40·12	7·48	1.25
								(38·88	8·72)*	
967	Black mangrove (*Bruguiera*	Small tree, Hull	10·63	67·02	22·35	13·31	9·04	13·83	8·52	1·33
	(*Rheedii*) *Blumii*)							(13·75	8·60)*	
968	Ditto ditto ...	Small tree, Maria Creek...	11·48	63·60	25·12	15·96	9·16	17·54	7·58	1·14
969	Ditto ditto ...	Large tree, Maria Creek...	10·32	53·56	35·12	20·64	14·48	25·96	9·16	1·76
				(54·23	35·45	20·85	14·60	26·78	8·67)*	
970	Ditto ditto ...	Medium tree, Hull ...	11·05	62·40	26·55	18·53	8·02	20·40	6·15	1·09
971	Red mangrove (*Brug. parvi-*	Small tree, Hull	10·92	69·18	19·90	10·16	9·74	10·68	9·22	1·92
	flora, White and Arnott)									
973	Ditto ditto ...	Large tree, Maria Creek...	10·96	73·01	16·00	5·18	10·82	6·18	9·82	·77
								(6·12	9·88)	
974	Grey mangrove (*Ceriops*	Large tree, Hull	9·82	50·68	39·50	26·20	13·30	30·30	9·20	·63
	Candolleana, Arnott)					26·52	12·98)*			
975	Ditto ditto ...	Small tree, Hull	9·36	58·32	32·32	21·04	11·28	23·50	8·82	·80
976	Ditto ditto ...	Large tree, Maria Creek...	8·72	52·53	38·75	25·95	12·80	27·23	11·52	1·33
						(25·75	13·00)*			
978	*Sonneratia alba*, Lam. ...	Hull	10·69	71·86	17·45	7·40	10·05	8·13	9·33	1·40
979	Cedar mangrove	Mourilyan	9·13	56·57	34·30	22·68	11·62	26·72	7·58	1·13
977	Milky Mangrove (*Excæceria*	...	7·94	64·06	28·00	13·50	14·50	13·75	14·25	1·73
	Agallocha, Linn.)					(13·15	14·85)*			
972	Apple mangrove (*Carapa*	...	6·76	55·14	38·10	22·63	15·47	24·20	13·90	2·66
	moluccensis, Lam.)									
—	Mangrove (young tree) ...	Cairns	8·32	44·93	46·70	31·95	14·75	36·25	10·45	·90
—	(Mangrove (old tree) ...	Cairns	8·56	42·64	43·80	35·50	13·30	39·68	9·12	1·33

II.—Imported Commercial Materials, Indigenous Barks, and Various.

—	Mangrove bark	Thursday Island	8·86	49·84	41·30	24·68	16·62	31·25	10·05	2·50
—	Ditto	Ditto	8·30	49·75	41·95	23·60	12 35	32·57	9·38	1·60
—	Wattle bark	Queensland-grown ...	8·61	57·29	34·10	21·60	12·50	28·95	10·15	2·25
1669	Ditto	South Australian ...	15·10	46·00	38·90	28·18	10 72	31·68	7·22	1·33
1100	Bark of short knotty Cypress pine	...	4·53	78·47	17·00	10·72	6·28	12·50	4·30	1·00
1099	Bark of tall-growing commercial pine	...	4·11	84·17	11·72	4·76	6·96	7·34	4·38	·55
—	Bark of hoop pine (*Araucaria Cunninghamii*)	Canungera	5·61	81·59	12·80	2·56	10·24	3·60	9·20	·80
1639	Bark of *Eugenia Francisii*, Bail.	Kin Kin, Blackall Range	8·52	70·13	21·35	10 00	11·35	12·95	8·40	2·00
—	Mallet Bark	Western Australia ...	8·02	41·78	50·20	34·88	15·32	40·87	9·33	·93
						(35·58	14·32)*			
1670	Myrobalans	...	9·76	45·97	44·30	22·35	21·95	30·58	13·72	3·74
1671	Valonia	...	10·36	51·04	38·10	17·35	20·75	26·35	11·75	2·37
1668	Spent tan bark	Local tannery	13·92	74·13	11·95	8 75	3·20	10·70	1·25	1·04
1559	Tan liquor	Ditto	—	—	13 74	9·01	4·70	11·13	2·61	·62
1558	Spent tan liquor	Ditto	—	—	2·35	·97	1·38	1·39	·96	·32
1790	Spent tan bark (2nd sample)	Ditto	9·82	81·82	8·36	5·94	2·12	6·32	2·04	·64
1790	Ditto (extracted with cold water)	Ditto	—	—	6·36	4·13	2·23	4·72	1·64	·52
1447	Tanning extract	Imported	8·00	1·20	90·80	51 90	38·90	67·70	23·10	·48
1447a	English oak extract ...	Ditto	60·30	—	39·70	17·89	21·81	26·10	13·60	2·00

Queensland Acaciæ.

1759	*Acacia leptocarpa*	Endeavour River ...	9·35	83 99	6·66	2·59	4·07	2·26	4·40
1760	*Acacia crassicarpa* ...	Ditto ...	9·75	87·58	2·67	·17	2·50	·27	2·40
1761	*Acacia falcata*	Gladstone	12·34	50·03	37·60	27·17	10·43	33·20	4·40
					(38·70	28·00	10·70	34·16	4·54)*
1762	Dalby myall (*Acacia stenophylla*)	Dalby	9·10	76·22	14·68	8·30	6·38	10·68	4·00
1763	*Acacia flavescens*	Endeavour River ...	11·14	84·72	4·14	·56	3·58	1·74	2·40
1764	Ironwood (*Acacia excelsa*)	Dalby	9·82	73·38	16·30	10·88	7·92	13·60	3·20
1765	Weeping myall (*Acacia pendula*)	Ditto	9·18	82·82	8·00	3·80	4·20	4·93	3·07
1766	Brigalow (*Acacia harpophylla*)	Rockhampton	9·48	71·42	19·10	13·34	5·76	14·97	4·13

Note.—(... ...)* Duplicate determination.

QUALITATIVE REACTIONS OF MANGROVE AND ACACIÆ BARK.

—	Boiled with equal vol. of dil. H_2SO_4.	Bromine Water.	Dilute Ferric Chloride.	On addition of NH_3.	Soln. of Tartar Emetic.	On addition of NH_4Cl.	Soln. of Copper Sulphate.	On addition of NH_3.	Lime Water.	Concentrated H_2SO_4 at point of Contact.	Solution of Iron Alum.	Ammon. Molybdate in HNO_3.
Rhizophora mucronata, Lam.	Slight flocculent ppt.	Heavy dark-brown ppt.	Dirty brown colour	Purple-black ppt	No ppt.	Pale red ppt.	No ppt.	Brown ppt. dissolving in excess to brown solution	Red brown ppt.	Violet-red ring	Brown or green-brown ppt.	No ppt.
Bruguiera (Rheedii) Blumii	Do.	Heavy brown ppt.	Green-brown colour	Brown-black ppt.	do.	do.	do.	do.	Light red-brown ppt.	do.	Green-brown ppt.	do.
Bruguiera parviflora, White and Arnott	Do.	Heavy light-brown ppt.	Dirty brown ppt.	Dark-brown ppt	do.	do.	do.	do.	Red-brown ppt.	do.	Brown ppt.	do.
Ceriops Candolleana, Arnott	Do.	Heavy brown ppt.	Dirty brown ppt. or colour	Purple-black ppt.	do.	do.	do.	do.	Light-red ppt	do.	do.	do.
Sonneratia alba, Lam.	Do.	Brown ppt.	Green-brown colour	Brown black ppt.	do.	do.	do.	do.	Red-brown ppt.	do.	Blue-black colour	do.
Excaecaria Agallocha, Linn.	Do.	Heavy dark-brown ppt.	Dirty brown ppt.	do.	do.	do.	do.	do.	do.	do.	Brown ppt.	do.
Carapa moluccensis, Lam.	Do.	Heavy light-brown ppt.	do.	do.	do.	do.	do.	do.	Brown ppt.	do.	Green-brown ppt.	do.
Acacia falcata	Slight ppt.	Light-brown ppt.	Green-brown ppt.	Brown ppt.	do.	Light ppt.	Slight ppt.	Brown ppt.	Light-brown ppt.	Crimson ring	Grey-black ppt.	do.
Acacia stenophylla	Do.	do.	Brown ppt.	do.	do.	do.	do.	do.	do.	do.	do.	do.
Acacia excelsa	Do.	do.	do.	do.	do.	do.	do.	do.	do.	do.	Brown-black colour	do.
Acacia pendula	Do.	do.	Green-brown colour	Brown-black colour	do.	do.	No ppt.	Brown colour	do.	do.	do.	do.
Acacia harpophylla	Do.	do.	do.	do.	do.	do.	do.	do.	do.	do.	do.	do.
Araucaria Cunninghamii	No ppt.	Slight ppt.	Brown colour	Reddish ppt.	Faint opalescence	White ppt.	do.	do.	Dark-red ppt.	Purple-red ring	Brown colour	do.
Eugenia Francisii	Slight ppt.	No ppt.	Blue-black ppt.	Dark-brown ppt.	No ppt.	Light ppt.	Slight ppt.	Brown ppt.	Light-brown ppt.	Red-brown ring	Blue-black colour	Slight ppt.
Short knotty Cypress pine	No ppt.	Light-brown ppt.	Brown colour	Red-brown ppt.	do.	Pale ppt.	No ppt.	Dark brown colour	Dark red ppt.	Purple-red ring	Brown ppt.	No ppt.
Commercial pine	Do.	Slight ppt.	do.	do.	do.	do.	do.	do.	do.	do.	do.	do.
Queensland wattle bark	Slight flocculent ppt.	Heavy yellow ppt.	Flocculent green-brown ppt.	Dark-brown ppt.	do.	White ppt.	Slight ppt.	Brown ppt., dissolving in excess	Dark-brown ppt.	Crimson ring	Heavy blue-grey ppt.	do.
South Australian wattle bark	Do.	do.	do.	do.	do.	do.	do.	do.	do.	do.	do.	do.
West Australian mallet bark	Do.	do.	Green-black colour	do.	do.	Light red ppt.	do.	do.	do.	Purple-red ring	Green-black colour	do.

Forestry.

FENCING STUFF AND SLABS.

The palmy days of the splitter and fencer are almost of the past, since fencing wire and wire netting figure so largely amongst fencing material. At the same time, whilst timbered forest and scrub lands remain and are taken up by the selector, there is no reason why he should not save the expense of wire work, and utilise the timber which he has at hand. Why burn off good splitting timber and pay cash for wire? There are many Queensland-born farmers who have never had the opportunity to learn the art of splitting fencing stuff, palings, or shingles, simply because their life has been spent on almost treeless plains where wire fences and iron roofs are necessary owing to the want of timber. Similarly, there are hundreds of new arrivals, both from the Southern States and from oversea, who have located themselves on scrub lands and on open timbered country, who have no knowledge of the art of fencing with post and rails or palings. To these a few simple instructions will prove useful.

The first thing to learn is how to choose a tree which is "free"—that is, one that will split easily. Many trees have their fibres so interlocked that it is often impossible to burst open even a short log. Others run so freely that they can be split with the greatest ease. In selecting a tree, much can be learned from an examination of the bark of an iron bark or stringy bark. From its corrugation, the toughness or otherwise of the timber may be judged. If the perpendicular corrugations run in parallel lines, the tree will, in all probability, be easy to "burst." If, on the other hand, the bark lines are interlocked, the timber will probably be the same, and require great labour to open. Still, a log which is hard to burst will usually "run" more evenly than a free-bursting one. Many fencers take a large chip out of a tree, and if the chip splits freely, it is likely that the whole tree will split well; but the chip is no certain guide. If a tree is somewhat hollow, it is all the easier to split, and the hollowness of the tree may usually be guessed by noticing the broken branches and shoots growing from the main stem.

Having selected the tree, the next thing is to fell it. It requires good practice with the crosscut saw to fell a tree properly. First, a ring of bark about 6 in. wide must be removed. Then the saw is entered on the leaning side, if the tree is not perfectly perpendicular. In the latter case, the branches should be examined, and the cut should be put in on the side of the heaviest limbs, because that is the side to which the tree will incline when falling. When entering the saw, the back must be kept up, as it tends to sag downward. Having entered the saw to a depth not quite as far as the centre of the tree, withdraw it, go to the opposite side, and again enter the saw, being careful to see that the back cut is exactly in line with the "belly" cut. Having got the saw in to a little over its own width, without withdrawing it, move round to one side gradually, continuing to cut as you go. This is cutting out the "quarters." Do this on both sides till the quarter cuts join the belly cut. The quarter cuts must be deep, as the object is to avoid what is known as a "kick-up," which often happens in the case of a very free tree. This kick-up is very

dangerous, as the tree suddenly splits up for several feet, then breaks off above and falls either to the right or left without any warning. The quarter cuts prevent this. Now go back to the back cut, and, since there is plenty of room, drive in one or more wedges behind the saw. By means of these the saw is enabled to run freely, and, by judicious driving, the tree may be caused to fall exactly where required. A good help to this end is to cut out a notch from the stump, leaving the butt projecting about 3 in. This notch serves a double purpose. It leads the tree in the direction in which it should fall, and it quite prevents it from slipping back on the stump, and rushing backwards over it like a battering ram for several feet. As you continue to saw, keep the back wedges well hammered up. As soon as the tree begins to crack, keep your nerve. Saw as quickly as possible, so as to cut through the last inch. Then as the tree bows its head for the crash, on no account run away. Stand fast till you are sure it is going clear. Then step clear, for the butt may fly up and come down several feet on one side or the other. Running away is the most dangerous thing a man can do. It should be noticed that as the tree is falling it usually jumps a few feet from the front of the stump.

Having got the tree down, preferably on some logs laid to receive it, the next thing is to cut off the post or rail lengths required. At this work, some men think that by laying their weight into the saw they are doing good work. Nothing of the kind. The saw must be allowed to run easily, without any pressure, merely working by its own weight. If one man digs the saw in, he is only increasing his mate's work. When sawing off a log, as soon as there is room, tap in a wedge, which will keep the cut open and allow the saw to work easily.

Having sawn off the log, take the smallest and thinnest wedge, called the "entering wedge." Drive this in with the maul about 4 to 6 in. below the sapwood. Then enter another wedge lower down. When these are home, a crack will have been opened on top of the log. Insert a wedge into it near the end, drive it partly home, then help it with one or two more wedges as the crack extends towards the other end. Then drive them all home, and the upper part of the log is burst. Take the axe and cut any strings or splinters which may be holding the burst sides together. Then remove the wedges. It sometimes happens that the log is a tough one, and the entering wedge will not bite, but flies out at every blow of the maul. No amount of heavy work will induce it to enter, but put a little sand or earth in the opening made by the wedge; then tap very gently on the wedge, which will then usually grip and allow itself to be driven home.

The log being opened, the width of the rail or post has to be decided on, whether 10, 12, or 15 in. Say we decide on 12 in. Enter the wedges as before 12 in. from the opening, and no difficulty will be experienced in wedging off a billet 12 in. wide. Continue doing this on both sides of the log until only the bottom portion remains. Turn this over on its face and split it into three or four remaining billets. A log 3 ft. in diameter has thus produced 9 triangular billets, from which the rails or posts have to be "run." This is easy work compared to bursting off the billets. Lay the billet on its back or side and enter a wedge at a point at either end, which will lift off the "heart" and leave the billet of a width of 12 in. on one side and 6 or 8 in. on the other. Now, with a wedge mark off the thickness of the rail, say 2 in. (or 3 in. for posts). Then enter two wedges at once to prevent the wood splitting in the wrong direction. With a very free running tree, a good drive of the maul will often send them almost to the end of the billet, the rail jumping off without any

more wedging being required. If it does not do so, then take the running-out axe (about 14in. long). Pass the blade in just ahead of the wedges, and heave up on the long stout handle. The rail will be wrenched off for some distance. Now if the handle is slacked up, the splitter will find that he cannot move the axe an inch forward, because the rail closes on it and holds it as in a vice. Therefore, before slacking up, put in a wedge edge-ways behind and as close to the axe blade as possible. Then you can slack up and move the axe a foot or so forward. Now, give another wrench, and let your mate follow up with the wedge on edge till a final "snap" indicates that the rail is run off. In this way from three to six rails may be obtained. The narrowest will be about 8 in. wide.

It does not always follow that the rails or posts or slabs will run out so accommodatingly. When the first rail is running off, we see the split getting nearer and nearer to the snap or towards the heart. In one case it will run off to nothing, and in the other to perhaps 6 in. thick. This means getting perhaps only two rails out of a billet—a heart rail and an "outsider." Therefore the tendency to run off or in must be checked. How can this be done? The remedy is to withdraw the axe and wedges, as soon as the run-off is noticed, and so start at the other end. Here is where the nicety of splitting comes in. The rail, let us say, is running to a *thick* end. So, if we begin at that end, it will run to a *thin* end. Therefore the new split must begin at a thickness of about 4 in. Now we run it out, and it gradually gets thinner till it meets the first split at about the middle. The rail is thus saved, but it is what is technically known as a "met" rail, and is possibly useless owing to weakness in the centre. Heart rails are often used for a top rail, but they are brittle and will decay sooner than the others.

Knots and excrescences on rails are not a disadvantage—in fact, a knotty rail is stronger than any other.

Slabs for building a hut are run out in the same manner.

PROFITS OF RUBBER PLANTERS.

A statement such as that made by Sir Frank Swettenham lately that the Selangor Company, with a capital of £30,000, has spent £62,915 on the property and paid dividends amounting to £235,963 would almost take one's breath away if one were not becoming accustomed to these big profits and quick returns. Had anyone the remotest idea two or three years ago of the rewards in store for the rubber investor? Mr. H. K. Rutherford's excellent speech at the Seafield meeting shows how the most sanguine anticipations have been exceeded. The leading expert and planter who estimated the Seafield production in 1910 gave 25,000 lb.; the estate actually produced 201,405 lb., or eight times as much. For tapping to commence earlier than was expected, as in the case of the Pelmadulla, is common; the Pelmadulla is earning profits two years in advance of promise. And yet shareholders write letters declaring themselves uneasy because a section of the trees on the estates are of small girth. As Mr. John McEwan said, uniformity is impossible. Nor is the administration of the most successful estate child's play. The fine results obtained by the Kapar Pará—and it will no doubt beat its own 65 per cent. in the future—have only been secured by expert management and directorial vigilance.—"Rubber World."

General Notes.

TANNING A SHEEPSKIN WITH WOOL ON.

A fresh skin is the easiest to handle. Put the skin into a barrel of fresh spring water if it is newly taken off—say, within 24 hours. Soak for 24 hours; then lay over the side of a barrel and with the flesh side out. An old scythe, which will fit oval around the skin on the barrel, is excellent for a scraper. Stand at the end of the barrel on which one end of the skin hangs over, raise the end of the barrel so as to come up to the lower part of the abdomen, press the body firmly against the skin, so as to hold it firmly, and scrape with the scythe blade till all the tallow, flesh, and blood are scraped off; then turn the other end of the skin in the same position, and work likewise. If the skin has become dry in places, as often happens, scrape a little oftener, perhaps seen or eight times or strokes. If the skin is perfectly fresh, it should be scraped all over the second and third day after it has been put into the water, allowing about 15 to 30 minutes each day. If it has become dry, a little more scraping would be better, and a day or so more soaking. If the skin is dirty on the wool side, tramp it in the barrel, or pound with a plank before taking out for the second day's scraping; also scrape on the wool side, dashing water on it occasionally. Do not allow it to come into contact with the wool, as it has a tendency to colour it.

After the skin is ready for the tannage, lay the skin out flat, flesh side up, and apply the following:—Mix together pulverised alum, ½ lb.; common salt, about 1 lb.; saltpetre, ½ lb.; and about twice the quantity in bulk of bran as you have of the above chemicals. Mix them together, and sprinkle a nice even layer over the skin, folding the skin edges over to the backbone; then roll from the head till you roll it tight. Put into a cool place for a week; keep damp. After a week, open up and put on the other half of the bran and chemicals, after scraping off the first applied; leave about another week. It would be advisable to dampen by sprinkling a little water—say, a pint—before the second application. After the second week, hang over a scantling; hold the skin on one side of the scantling with the flesh side out, then start at the scantling and scrape down towards the ground with a mincemeat chopping-knife till the skin is softened on the whole flesh surface; then do the same with the other end of the skin. Do this a day or two later as the skin dries. Then take a horse-mane comb and comb out the wool, and it will make a fine rug or mat.—"Queensland Grazier."

Answers to Correspondents.

BRIGALOW.

R. A. MARKHAM, Tara—

Brigalow scrub should be dealt with as in clearing ordinary vine scrubs. Some acacias, to which family the brigalow belongs, will completely burn out roots and all when the felled scrub is fired. Others are hard to burn, and it is questionable whether repeated burning of brigalow country would entirely prevent the production of secondary growth. The bark is of no value for tanning purposes. Brigalow ash, by analysis, contains 54 per cent. of lime; 1.6 of magnesia; .7 of potash.

COTTON-SEED OIL.

INQUIRER, Rockhampton—

Your question as to the profits to be derived from the manufacture of cotton-seed oil, we are not in a position to answer. In a separate article in this issue, we give full particulars regarding the necessary machinery and its cost, together with information regarding the various processes passed through by the cotton-seed after leaving the gin. You will note that, even with the seed produce of 6,000 acres, a mill would be idle eight months of the year.

TIMBER FOR A FOUR-ROOMED WEATHERBOARD HOUSE.

NEW SELECTOR, Nambour:—

We are able to answer your question, thanks to a reply given by the "Farmer and Settler," Sydney, to an exactly similar query. The prices of the timber you will have to obtain from the sawmiller:—

" A Niangala correspondent recently wrote Uncle Wiseman that he wanted to build a weatherboard house, and asked what quantity of sawn timber he would require for a building of 24 ft. long by 22 ft. wide, with 8-ft. walls, and a passage through the middle of about the usual size. The house to contain four rooms?

" Uncle replied as follows:—' I have gone to a great deal of trouble to get this information for you, and the figures which you will find below really constitute the complete timber specifications for a wooden residence. You will see that the total quantity is set down at 3,873 ft., but this calculation has been made on a very narrow margin, no allowance being made whatever for waste, although deductions have been made for door and window openings—

" ' Bottom plate (5 x 4 if on piles), 153 ft.; top plate (4 x 3), 92 ft.; corner studs (4 x 4), 48 ft.; studs, (3 x 2), 216 ft.; ridge (6 x 1), 12 ft.; rafters, (32), (6 x 2 x 14 in. 6 ft. 9 in.), overhang, 464 ft.; collar, beams, battens, &c., 144 ft.; bearers (3), (6 x 3 x 24 ft.), 108 ft.; joists (14) (6 x 2 x 22 ft.), 308 ft.; braces, say 200 ft. (3 x 1), 50 ft.; flooring (4 x 1), 528 ft.; weatherboards, 7 in. x 1 in. (tapered to ½ in.) counted

running feet. 1,236 ft.; a total of 3,359 ft., to which must be added the inner partitions—namely, studs (3 x 2), 189 ft.; plates (3 x 2), 64 ft.; braces (3 x 1 sq., 80 in.), 20 ft.; and lining boards (4 x ½ in.), 241 ft.—a total of 3,873 ft.' "

"New Selector" will note that no mention is here made of stumps or stump caps, nor of iron roofing and guttering. It is merely a calculation of the building timber required.

POSTHOLE DIGGER.

In response to a request in last month's journal by a correspondent for information concerning a posthole digger, Mr. S. H. Wheildon, of Canaga, has been good enough to write as follows:—" In answer to Mr. Brown's inquiries *re* posthole digger, I would like to say that it will not do quite as much as is claimed for it by some of the agents, but I consider it worth its place where there is any quantity of fencing to be done. I gave it a trial alongside a really good graft-tool (by the way these kind of spades, although extensively used in Victoria, seem to be almost unknown here) on sandy loose soil, and it was slightly quicker than the graft-tool. If the ground is very hard it will not bore of itself, but can be used in conjunction with the crowbar, that is, to pick up the dirt and thus obviate the need of making such a large hole as would be necessary with the usual shovel. The digger would also be much better than the spade in digging in sticky wet ground or swampy land under water. I would strongly recommend anyone to get the digger with the improvement which allows the jaws to open and let the dirt out, as in digging in sticky ground it is a great convenience in getting dirt out of the jaws. The latest improved diggers also have an attachment in the form of a rack which can be let out and increase the size of the hole. As these attachments are fitted on top of the blade or jaws, however, they will, of course, only alter size of hole down to the top of the jaws, and that would leave the last bit, about 9 in., to be barred out or otherwise. My digger is an 8-in. one with its natural width of jaws, and that is big enough for ordinary wire fencing posts, so that I very seldom have to use the expansion attachment. The price of this implement is 25s. in Brisbane, but can be got for 15s. in Melbourne. Hoping that this will supply the information Mr. Brown wanted."

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	JULY. Prices.
Apples (Eating), per case	8s. 6d. to 9s. 6d.
Apples (Cooking), per case	7s. to 7s. 6d.
Apricots, per case	...
Bananas (Cavendish), per dozen	3¼d. to 3¾d.
Bananas (Sugar), per dozen	2d. to 2¾d.
Citrons, per cwt.	...
Custard Apples, per quarter-case	4s. to 9s.
Grapes, per lb.	...
Lemons, per case	4s. to 6s. 6d.
Mandarins	3s. 6d. to 5s. 6d.
Nectarines, per case	...
Oranges, per case	1s. 6d. to 4s.
Papaw Apples, per quarter-case	1s. to 1s. 3d.
Passion Fruit, per quarter-case	2s. 6d. to 4s. 6d.
Peaches, per case	...
Peanuts, per lb.	2½d. to 4d.
Pears, per case	...
Persimmons, per quarter-case	...
Plums, per case	...
Pineapples (Ripley), per dozen	10d. to 1s. 9d.
Pineapples (Rough), per dozen	4d. to 9d.
Pineapples (Smooth), per dozen	1s. 6d. to 3s.
Tomatoes, per quarter-case	1s. to 3s.
Strawberries, per tray	1s. 3d. to 3s. 6d.
Strawberries, per doz. boxes	...
SOUTHERN FRUIT MARKET.	
Apples, choice, per case	5s. 6d. to 9s.
Apples (Cooking), per case	4s. to 5s.
Apricots, per gin case	...
Bananas (Queensland), per bunch	2s. to 7s.
Bananas (Queensland), per case	9s. 6d. to 11s.
Bananas (N. Queensland), per bunch	...
Bananas (Fiji), G.M., per bunch	2s. 6d. to 7s. 6d.
Bananas (Fiji), G.M., per case	10s. to 11s.
Cocoanuts, per dozen	2s. to 2s. 6d.
Custard Apples, per tray	6s. to 7s.
Grapes, per half-case	...
Lemons, per gin case	2s. 6d. to 3s.
Mandarins, per case	5s.
Mandarins (Queensland), per case	7s. to 8s.
Oranges (Queensland Navels), per case	9s. to 10s.
Oranges, per case	...
Passion Fruit, per half-case	3s. 6d. to 5s.
Papaw Apples, per case	4s. to 5s.
Peaches, per half-case	...
Peanuts, per lb.	5½d.
Pears, per gin case	6s. to 9s.
Persimmons, per half-case	3s. to 3s. 6d.
Pineapples (Queensland), common, per case	6s. to 6s. 6d.
Pineapples (Queensland), Ripley's, per case	6s. to 7s.
Pineapples (Queensland), Queen's, per case	6s. 6d. to 7s. 6d.
Plums, per half-case	2s. 6d. to 4s.
Pomegranates, per gin case	...
Quinces, per gin case	...
Tomatoes, per half-case	5s. 6d. to 6s.
Strawberries, per 3-quart tray	...

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JULY.

Article.		JULY. Prices.
Bacon, Pineapple ...	lb.	7d. to 8d.
Barley, Malting ...	bush.	...
Bran ...	ton	£5 15s.
Butter, Factory ...	lb.	10d. to 11¼d.
Chaff, Mixed ...	ton	£3 to £4 5s.
Chaff, Oaten (local) ...	"	£4 to £5 5s.
Chaff, Lucerne ...	"	£6 to £6 5s.
Chaff, Wheaten ...	"	£3 to £3 5s.
Cheese ...	lb.	6½d. to 7½d.
Flour ...	ton	£9 5s.
Hay, Oaten (Victorian) ...	"	£7
Hay, Lucerne ...	"	£3 5s. to £4
Honey ...	lb.	2d. to 2¾d.
Maize ...	bush.	2s. 8½d.
Millet (Broom) ...	ton	...
Oats ...	bush.	3s. 2d. to 3s. 8d.
Pollard ...	ton	£5 10s.
Potatoes ...	"	£9 to £9 10s.
Potatoes, Sweet ...	cwt.	2s. 6d. to 3s.
Pumpkins ...	ton	£2 to £2 5s.
Pumpkins, Cattle ...	"	£2 to £2 5s.
Wheat, Milling ...	bush.	3s. 6d.
Onions ...	ton	£4 10s.
Hams ...	lb.	10d. to 11d.
Eggs ...	doz.	1s. 1½d. to 1s. 4d.
Fowls ...	pair	2s. 6d. to 3s. 10d.
Geese ...	"	7s. to 7s. 6s.
Ducks, English ...	"	3s. 3d. to 3s. 8d.
Ducks, Muscovy ...	"	3s. 5d. to 4s. 3d.
Turkeys (Hens) ...	"	6s. 9d.
Turkeys (Gobblers) ...	"	11s. to 13s.

TOP PRICES, ENOGGERA YARDS, JUNE, 1911.

Animal.	JUNE. Prices.
Bullocks ...	£7 10s. to £8 12s. 6d.
Cows ...	£5 10s. to £7 7s. 6d.
Merino Wethers ...	19s. 3d.
Crossbred Wethers ...	19s. 3d.
Merino Ewes ...	15s. 6d.
Crossbred Ewes ...	18s.
Lambs ...	14s.
Pigs (Porkers) ...	33s.

PRICES OF FARM PRODUCE FOR JUNE.

LONDON QUOTATIONS.

Article.	JUNE. Price.
Cotton (Uplands), per lb.	7·43d.
Cotton (Sea Island), per lb.	12d. to 20d.
Cotton Seed, per ton	£7 13s. 9d. to £8 2s. 6d.
Rubber (Pará), per lb.	4s. 11d. to 5s. 1d.
Rubber (Ceylon, Smoked), per lb.	...
Copra (S.S.), per ton	£21 to £21 7s. 6d.
Copra (Ceylon), per ton	£22 15s.
Copra (Malabar), per ton	£23 5s. to £23 12s. 6d.
Hemp (Manila), per ton	£19 15s. to £21
Hemp (Sisal), per ton	£22 to £22 10s.
Hemp (Indian Sisal), per ton	£14 to £19
Hemp (Mauritius), per ton	£24 10s. to £25 10s. to £27
Ramie Fibre (China Grass), per ton	£40 to £48
Soja Bean Oil, per cwt.	31s.
Soja Beans, per ton	£7 5s. to £7 6s. 3d.
Coffee (Costa Rica), per cwt.	62s. to 76s.
Coffee (Fair Greenish), per cwt.	62s. to 74s. 6d.
Coffee (Low Middling), per cwt.	64s. 6d. to 75s.
Coffee (Bold Fair), per cwt.	67s. to 76s.
Coffee (Peaberry), per cwt.	69s. 6d. to 85s.

Times of Sunrise and Sunset at Brisbane, 1911.

Date.	May. Rises.	May. Sets.	June. Rises.	June. Sets.	July. Rises.	July. Sets.	August. Rises.	August. Sets.
1	6·13	5·17	6·30	5·1	6·39	5·3	6·30	5·18
2	6·14	5·16	6·31	5·0	6·39	5·4	6·30	5·19
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·32	5·0	6·39	5·4	6·29	5·20
5	6·15	5·14	6·32	5·0	6·39	5·5	5·28	5·20
6	6·16	5·13	6·32	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·6	6·27	5·21
8	6·17	5·12	6·33	5·0	6·39	5·6	6·26	5·22
9	6·17	5·11	6·34	5·0	6·39	5·6	6·25	5·22
10	6·18	5·10	6·34	5·0	6·39	5·7	6·24	5·23
11	6·18	5·10	6·34	5·0	6·39	5·7	6·24	5·23
12	6·19	5·9	6·35	5·0	6·39	5·8	6·23	5·24
13	6·20	5·8	6·35	5·0	6·38	5·8	6·22	5·24
14	6·20	5·8	6·36	4·59	6·38	5·9	6·21	5·25
15	6·21	5·7	6·36	4·59	6·38	5·9	6·20	5·25
16	6·21	5·7	6·36	5·0	6·38	5·10	6·19	5·26
17	6·22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·6	6·37	5·0	6·37	5·11	6·18	5·27
19	6·23	5·5	6·37	5·0	6·37	5·12	6·17	5·27
20	6·24	5·4	6·38	5·0	6·36	5·12	6·16	5·28
21	6·24	5·4	6·38	5.0	6·36	5·13	6·15	5·28
22	6·25	5·4	6·38	5·1	6·35	5·13	6·14	5·29
23	6·25	5·3	6·38	5·1	6·35	5·14	6·13	5·29
24	6·26	5·3	6·38	5·1	6·35	5·14	6·12	5·30
25	6·26	5·2	6·39	5·1	6·34	5·15	6·11	5·30
26	6·27	5·2	6·39	5·2	6·33	5·15	6·10	5·31
27	6·27	5·2	6·39	5·2	6·33	5·16	6·9	5·31
28	6·28	5·2	6·39	5·2	6·32	5·16	6·8	5·32
29	6·28	5·1	6·39	5·3	6·32	5·17	6·7	5·32
30	6·29	5·1	6·39	5·3	6·31	5·17	6·6	5·32
31	6·30	5·1	...	...	6·31	5·18	6·5	5·33

Phases of the Moon.

			H. M.
5 May	☾	First Quarter	11 14 p.m.
13 ,,	○	Full Moon	4 10 ,,
21 ,,	☽	Last Quarter	7 23 ,,
28 ,,	●	New Moon	4 24 ,,
4 June	☾	First Quarter	8 4 a.m.
12 ,,	○	Full Moon	7 51 ,,
20 ,,	☽	Last Quarter	6 51 ,,
26 ,,	●	New Moon	11 20 p.m.
3 July	☾	First Quarter	7 20 p.m.
11 ,,	○	Full Moon	10 53 ,,
19 ,,	☽	Last Quarter	3 31 ,,
26 ,,	●	New Moon	6 12 a.m.
2 Aug.	☾	First Quarter	9 29 a.m.
10 ,,	○	Full Moon	0 55 p.m.
17 ,,	☽	Last Quarter	10 11 ,,
24 ,,	●	New Moon	2 14 ,,

Orchard Notes for September.

THE SOUTHERN COAST DISTRICTS.

The marketing of citrus fruits, in the later districts, of the late winter or early spring crop of pines and bananas, also of strawberries and Cape gooseberries, will continue to occupy the attention of fruit-growers. I can only repeat the advice I have so often given in these Notes respecting the marketing of all kinds of fruit—viz., to grade the fruit evenly, pack honestly, and display it to the best advantage if you want to get good returns.

September is a very important month to the fruit-grower, owing to the fact that it is usually a dry month, and that it is essential in all cases to keep the land in a high state of tilth, so as to retain the moisture that is required by the various trees that are in blossom, thus securing a good set of fruit. Where irrigation is available, it is advisable to give the trees a good watering should the ground be dry, as this will induce a good growth and cause the fruit to set well. If an irrigation is given, it should be a thorough one, not a mere surface watering, and once the land is saturated the moisture must be retained in the soil by constant and systematic cultivation. If this is done, one good watering will usually be enough to carry the trees through in good condition to the thunderstorms that come later or even to the summer rains, if the soil is of a deep sandy loamy nature.

No weeds must be allowed in the orchard or vineyard at this time of the year, as they are robbing the trees and plants of both the water and plant food that are so essential to them at this period of their growth.

There is not much to be done in the way of fighting scale insects during the month, as they are more effectually dealt with later on; but where young trees are showing signs of distress, owing to the presence of scale insects, they should be treated, the gas method being the most efficacious.

Beetles and other leaf-eating insects often make their appearance during the month. The best remedy is to spray the trees or plants with one or other of the arsenical washes that are recommended by me in this journal. The vineyard will require considerable attention. Not only must it be kept well worked, but any vines that are subject to the attack of black spot must be sprayed from time to time with Bordeaux mixture. Disbudding must be carefully carried out, as this work is equally as important as the winter pruning, as it is the best means of controlling the future shape of the vine. A very common fault with vines grown in the coast districts is that the buds often remain dormant, only the terminal bud and possibly one other starting into growth, thus leaving a long bare space on the main rods, which is undesirable. When this takes place, pinch back those shoots that have started, and which are taking the whole of the sap, and force the sap into the dormant buds, thus starting them into growth. This will result in an even growth of wood all over the vine—not a huge cane in one part and either a stunted growth or dormant buds on the rest.

Every care should be taken during the month to prevent the fruit-fly from getting an early start. All infested oranges, loquats, kumquats, or other fruits should be gathered and destroyed, as the keeping in check of the early spring crop of flies, when there are only comparatively few to deal with, will materially lessen the subsequent crops. Land that is

to be planted to pines or bananas should be got ready now, though the planting need not be done till October, November, or even later. Prepare the land thoroughly; don't scratch the surface to the depth of a few inches, but plough as deeply as you have good surface soil, and break up the subsoil as deeply as you can possibly get power to do it. You will find that the extra money expended will be a profitable investment, as it will pay every time.

Tropical Coast Districts.

September is usually a very dry month, and fruit trees of all kinds suffer in consequence. The spring crop of citrus fruits should be harvested by the end of the month, as, if allowed to hang later, there is a great risk of loss by fly. The fruit should be well sweated; and, if carefully selected, well-graded, and well packed, it should carry well to, and fetch high prices in, the Southern States, as there are no oranges or mandarins grown in Australia that can excel the flavour of the best of the Bowen, Cardwell, Cairns, Port Douglas, or Cooktown fruit.

As soon as the fruit is gathered, the trees should be pruned and sprayed with the lime and sulphur wash, as this wash is not only a good insecticide, but it will keep down the growth of all lichens, mosses, &c., to which the trees are very subject.

Every care should be taken to keep down the crop of fruit-fly during the month. All infested fruit should be gathered and destroyed, particularly that in or adjacent to banana plantations. Watch the banana gardens carefully, and keep well cultivated. New land should be got ready for planting, and where land is ready planting can take place.

Papaws and granadillas are in good condition now, and, if carefully gathered and well packed in cases only holding one layer of fruit, they should carry well to the Southern markets if sent in the cool chamber.

Southern and Central Tablelands.

Prune grape vines at Stanthorpe in the early part of the month, leaving the pruning as late as possible, as the object is to keep the vines back in order to escape damage from late spring frosts. All vines subject to the attack of black spot should be treated with the winter dressing when the buds are swelling; this treatment to be followed by spraying with Bordeaux mixture later on.

Where fruit trees have not received their winter spraying, they should be treated at once before they come out into flower or young growth. Where the orchard or vineyard has not been ploughed, do so, taking care to work the land down fine as soon as it is ploughed, so as to keep the moisture in the soil, as the spring is always the trying time for fruit trees.

Look out for fruit-fly in the late oranges and loquats in the Toowoomba district. Keep the orchards and vineyards well cultivated; disbud the vines when sufficiently advanced. Spray for codlin moth.

In the Central tablelands irrigate vines and fruit trees, and follow the irrigation with deep, constant, and systematic cultivation. Keep down all weed growth, and fight the red scale on citrus trees with cyanide. The objective of the fruit-growers throughout Queensland during September and the following months is, "How best to keep the moisture in the soil that is required by the trees, vines, plants, and vegetables;" and this objective can only be obtained by irrigation where same is available, or by deep, systematic, and constant cultivation where there is no water available for irrigation.

Farm and Garden Notes for September.

FIELD.—Spring has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly cultivated, uncleaned ground. Therefore, the cultivator and the horse and hand hoe must be kept vigorously at work to check the weed pests and save the growing crops and much future labour. Attend to earthing up any crops which may require it. There may possibly occur drying winds and dry weather; still, good showers may be looked for in October, and much useful work may be done during the present month which will afford a fair prospect of a good return for labour.

Plant out *Agave rigida, var. sisalana* (sisal hemp plant) in rows 9 ft. by 9 ft., 8 ft. by 8 ft., or 6 ft. by 8 ft. apart, according to the richness of the soil. All dry places on the farm, too rocky or poor for ordinary crops, should be planted with this valuable aloe; especially should limestone country be selected for the purpose. If the soil is very poor and the plants very small, it is better to put the latter out into a nursery of good soil, about 1 ft. to 18 in. apart. Next year they will be good-sized plants. Keep down tall weeds in the plantation, and do not allow couch grass to grow round the roots. The sisal will do no good if planted in low, wet land, or on a purely sandy soil. It thrives best where there is plenty of lime, potash, and phosphoric acid, all of which can be cheaply supplied if wanting in the soil. Sow cotton—Sea Island—near the coast, and Upland generally; Caravonica succeeds best in Northern Queensland. Sow maize, sorghum, imphee, mazzagua, prairie grass, panicum, tobacco, and pumpkins. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, ginger, and canaigre—the latter a bulb yielding a valuable tanning substance. Plant out coffee.

KITCHEN GARDEN.—Now is the time the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing most kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost; dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and stir the soil in the latter case early next day to prevent caking. Mulching with straw or leaves or litter will be of great benefit as the season gets hotter. It is a good thing to apply a little salt to newly dug beds. It is not exactly known what the action of salt is on the soil, but when it is applied as a top-dressing it tends to check rank growth. A little is excellent for cabbages, but too much renders the soil sterile, and causes hard-pan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow cucumbers, melons, marrows, and squashes at once. If they are troubled by the beetle, spray with Paris green or London purple. In cool districts peas and even some beetroot may be sown. Set out egg-plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach,

lettuce, vegetable marrows, custard marrows, parsnips, carrots, eschalots, cabbage, raddishes, kohl-rabi, &c. These will all prove satisfactory provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

Flower Garden.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature, and see that the bulbs do not come in contact with fresh manure. Keep a good look-out for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snapdragon, coleus. Roses will now be in full bloom. Keep them free from aphis, and cut off all spent blooms. This latter work should be done in the case of all flowers. If you wish to save seeds, do not wait for the very last blooms, but allow some of the very best to go to seed. If you have any toads in the garden or bush-house, encourage them to take up their abode there. They are perfectly harmless in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, galliardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulacca, mesembryanthemum, calendula, &c.
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Bowen (North Queensland).

[CONTINUED.]

Any article dealing with the Bowen district omitting a reference to Mr. George Kent's property would be incomplete. "The Woodlands," aptly named, is one of the many charming spots of North Queensland, and the proprietor and his wife are noted for their hospitality as well as for the able manner in which the orchard and garden are handled.

When the Governor was touring the North, in July, 1910, he was naturally taken to "The Woodlands," and that noted botanist found the time all too short to inspect and admire the variety of plants, trees, and shrubs gathered here from the four quarters of the globe.

The second glimpse of Mr. Kent's property suggests the tropics. Numerous cocoanut palms raise their graceful heads above a background of some of the finest mango trees to be seen in the State. Not less than forty different varieties of this fruit find a home here, and as many as forty cases of fruit have been picked from one tree.

Our first plate shows a typical Bowen avenue of citrus trees. The people of Brisbane, Sydney, and Melbourne know that when the brand "G.K." is on the case the fruit at the bottom is quite as large as that packed on the top.

Mr. Kent's holding consists of 150 acres of some of the choicest land in the district. Last year from 35 acres of cultivation no less than 7,100 cases of citrus and mango fruits, cucumbers, and tomatoes were shipped; the only difficulty experienced was the obtaining of sufficient labour to pick and ship the crop.

Plate III. gives but a faint idea of the packing-house on Mondays and Thursdays, when some hundreds of cases are forwarded to Southern markets. By kind permission of the proprietor we are enabled to dissect the 1910 output as follows:—

1,600 cases of fruit at prices ranging from 4s. to 8s. each.

3,500 cases of tomatoes at prices ranging from 3s. to 6s. 6d. each.

2,000 cases of cucumbers at prices ranging from 4s. to 8s. each.

Mr. Kent is one of the farmers who "plays the game" of irrigation and cultivation for all it is worth, and the numerous requests for information and advice must be a severe tax on his time. But, as the old saying has it: "Always go to a busy man if you want anything done."

The last three months has been what is locally known as a "dry spell," but "The Woodlands," owing to its thorough system of irrigation (upwards of 8,000 gallons of water per hour are distributed when

the plant is in full swing), is a garden in every sense of the word. Even with nine assistants the holding is unable to cope with the orders on hand from all parts of Australia—from North and South the orders come flowing in.

Plate IV. illustrates the picking season on Messrs. Broadhead Brothers' orchard on the Lower Don.

There are upwards of 3,000 trees on this plantation, of which citrus trees predominate, but mangoes form no small part. This orchard is one of the oldest in the district, and for years was in the hands of Mr. Hildebrandt, who sold to the persent proprietor last year after making a competency from the property.

Plate V. shows Mr. S. Jensen's citrus orchard, and to this gentleman belongs the honour of picking the largest crop from any one tree in a single season. His record stands as thirty-seven cases of fruit from one mandarin tree.

The rich lands of Bowen have tempted a number of New Zealanders to settle in the district, and within a radius of half a mile on the Don Delta may be counted no less than five families who have been attracted to seek their fortunes here.

Among these may be mentioned Mr. A. G. Black, president of the Bowen Farmers' Union, and member of the Shire Council, who is developing a large pineapple plantation.

Another earnest worker for the district is Mr. T. J. Mullan, secretary for the Farmers' Union, also from New Zealand, who has a fine showing of pines, and who is at pesent busily engaged in extending his clearing for citrus trees and in building one of the first concrete houses here. Mr. Mullan maintains that, as excellent building sand is obtainable in unlimited quantities from the river bed, the whole of the buildings of the district should be of concrete. A building of this material is not only exceptionally cool and impervious to the attacks of the white ant but the outgo for repairs and insurance is practically nil. The sand may be obtained simply for the haulage, but if the supply were within reach of any city it would be worth not less than 7s. 6d. per load.

Practically the only farmer who has devoted any systematic attention to the cultivation of papaw trees is Mr. T. C. Jensen, of the Don Delta. This gentleman has found a ready local market for this produce to date, and states that he could have disposed of at least five times the quantity before considering export South.

As this farmer modestly states: "The little farm" of 6 cultivated acres produced last year from pines, tomatoes, and cucumbers a net return of ——, mentioning a figure largely in excess of the earnings of an average chief clerk in a big city firm. As further areas are being denuded of forest trees and scrub it is to be hoped that this holding will rapidly increase not only in size but in returns to the industrious proprietor.

Plate I.

Virgin Forest at Bowen before Clearing and Planting.

Plate II.

Mr. Kent's Orchard, "The Woodlands," Bowen.

Plate III.

MR. G. KENT'S PACKING HOUSE, BOWEN.

Plate IV

Messrs. Broadhead Bros.' Orchard, Bowen.

Plate V.

Mr. Jensen's Orchard, Bowen.

In illustration of the growth of values we may state that within the past six years this property has increased not less than 500 per cent. on the purchase money then paid for it.

Now that Bowen has access to Proserpine Sugar Mill by rail, several of the farmers are planting sugar-cane; notably among these may be mentioned Messrs. Maltby, Withnall, Andrews, and Field.

During the Hon. W. T. Paget's visit he stated that Mr. Field's cane showed the finest growth for the period planted of any crop that had come under his notice.

It is computed that there is not less than 8,000 acres of land in the Bowen district suitable for sugar-growing, and, with an abundant supply of water for irrigation purposes, we shall be astonished if this industry does not make rapid progress. The frosts are so slight that damage to cane from this source is scarcely worth considering.

Bowen is favourably known as a horse-breeding centre, as during the South African war upwards of 3,000 horses were shipped from the port as British remounts.

The Merinda Meat Works, established in 1884 (Messrs. Bergl, Australia, Limited), with Mr. C. J. Marshall as local manager, absorb the bulk of the fat cattle produced on the numerous surrounding stations. Last year 16,000 head passed through the works, giving employment to 200 men during the season.

The proposition to approach the company to take up the industry of fruit-canning is being closely discussed by many of the farmers, and, with the rapid extension of the pineapple plantations, it is more than probable that a definite move in this direction will be made at an early date.

The Rosella Fruit Preserving Company, of Melbourne, have just started a pulping factory for handling the surplus tomato crop, and with the price offering, £3 10s. per ton delivered at the works, it is estimated that not less than £1,500 per annum will be distributed amongst the farmers from this source alone.

The visit of the Federal steam trawler has established the fact that the Bowen waters provide excellent fishing grounds, and if systematically handled the industry should prove a dividend-paying business. On completion of the railway to Ayr the fish supply would find a ready outlet in the Northern and Western towns.

For the man fond of sport, Bowen is a veritable paradise. Every kind of water-fowl abounds, and record bags from gun and line are the order of the day during the season.

For a certainty, the days when the name "Sleepy Hollow" will serve as a synonym for Bowen are numbered. The district cries aloud for population. If the men and women of Great Britain who are desirous of greater freedom and happier conditions only knew of the possibilities here, they would come in thousands to the larger life that awaits them.

The College exhibits this year, notwithstanding a very dry and exceedingly frosty winter, were equal to, if they did not surpass, those of last year.

These comprised various kinds of grain, fodder, green and dry, and in the form of silage. The cotton exhibit was exceptionally good, and provided a good object lesson to those who think that cotton is a tropical product which cannot be produced except under tropical conditions, forgetting that the winter above the Little Liverpool Range and beyond it, on the Darling Downs, lasts rarely longer than three or four months, and that during the other months of the year, particularly from August to April or May, ideal climatic conditions prevail for the successful cultivation of cotton. There was over a ton of cotton produced last season at the College, more as an educational than a commercial crop. The ginned cotton was of very fine quality, and would readily bring 8d. per lb. in the English market. Amongst other exhibits were bacon, hams, and other pig products, all prepared at the college by the students. Butter, cheese, honey, dried fruits, seeds, vegtables, hay, wheat, barley, oats, and a host of other farm products were not only well displayed, but were all clearly labelled. Not only were products of the soil, the dairy, the piggery, poultry pen, and apiary to the fore, but the students' work was further exemplified by exhibits of horseshoes and many parts of farm implements.

The exhibits were beautifully arranged in four bays, each set in a framework of cereals and fodder grasses. The first bay was mainly devoted to cotton and wool, the second to dairy products, the third to products of the farm and garden, and the fourth to fruit and vegetables.

In addition to the foregoing, the college exhibit included samples of wool, which had been donated to the institution by pastoralists in different parts of the State, and grasses in bales, together with specimens of eighty indigenous grasses. There were also artificial grasses and clovers in pots, including Paspalum, Rhodes, Rye, *Panicum muticum,* and Canary grasses. In the dairying section there were butter and cheese, including potted and six new varieties of cheese; while the pig trophy included bacon, hams, and small goods. There was also a collection of seeds in bottles, and preserved fruits, with an exhibit of ensilage. The industrial department of the college provided saddlery, blacksmithing, and carpentry work, including models of gates and haysheds. There was a variety of potatoes and chaffs, and a honey trophy.

The live stock exhibited by the college included forty-eight head of purebred dairy cattle, consisting of sixteen bulls (Ayrshires, Jerseys, Holsteins, Kerry, and Lincoln Reds). The cows and heifers numbered thirty-two, and were of the same breeds as the above-mentioned, except that they included two Illawarras. In the horse section there were the imported Clydesdale stallion, Lord Cellus, an imported Clydesdale mare, with foal at foot, a two-year-old mare, and a yearling. There were thirty head of poultry, and sixteen pigs consisting of Berkshires, Yorkshires, and British Black.

This year the College stock entered into competition with other exhibits for honours only, money prizes not entering into consideration. The awards showed that the College secured the largest number of prize cards, which amounted to no less than 45, 25 of which were for cattle, 8 for horses, 6 for pigs, and 6 for poultry. In the cattle section there were 2 champions, 1 reserve champion, 8 first, 7 second, and 5 third awards. Horses secured 2 champions, 1 reserve champion, 4 first, and 1 second prizes. Pigs and poultry secured equal honours—viz., 4 first and 1 second prizes.

STATE FARM EXHIBITS.

The State Farm Sections occupied a considerable space near the upper entrance to the grounds, and were all contiguous. Everything had been done to give artistic effect to this section, and the result was most pleasing. Advantage had been taken of every post and every wall or partition to display the varied products which were brought together here. The State Farms represented were Westbrook, Hermitage, Biggenden, Roma, and Kamerunga.

Each of these farms had a specialty in respect to products, although, generally speaking, all the Southern farms produce somewhat similar products.

THE WESTBROOK STATE FARM,

which is near Toowoomba, has always been noted for its fruit production, especially apples, pears, apricots, peaches, plums, almonds, olives, and grapes. It was, therefore, these products which predominated here. More particularly were the European fruits in evidence, as thse thrive admirably in the cool climate of the Darling Downs. Some of the dried fruits were of excellent quality, and have been pronounced by connoisseurs to be fully equal in appearance and flavour to the best imported. But the great value of the work at Westbrook lies in the growing and selection of the best kinds of fruit trees. Many hundreds of trees have been rejected as valueless after they arrived at the fruiting stage, seemingly a loss, but, in effect, a most valuable elimination which, to the general fruit-grower, would be a very serious matter. By the procedure at Westbrook the orchardist can obtain fruit trees of all kinds guaranteed as to excellence and productiveness. It is the same with grape vines. All varieties unsuited to the Downs are removed, and their places filled by the most suitable varieties.

The other products from this farm were much the same in the shape of grasses, cereals, &c., as those shown in other sections, and do not call for special notice.

BIGGENDEN STATE FARM.

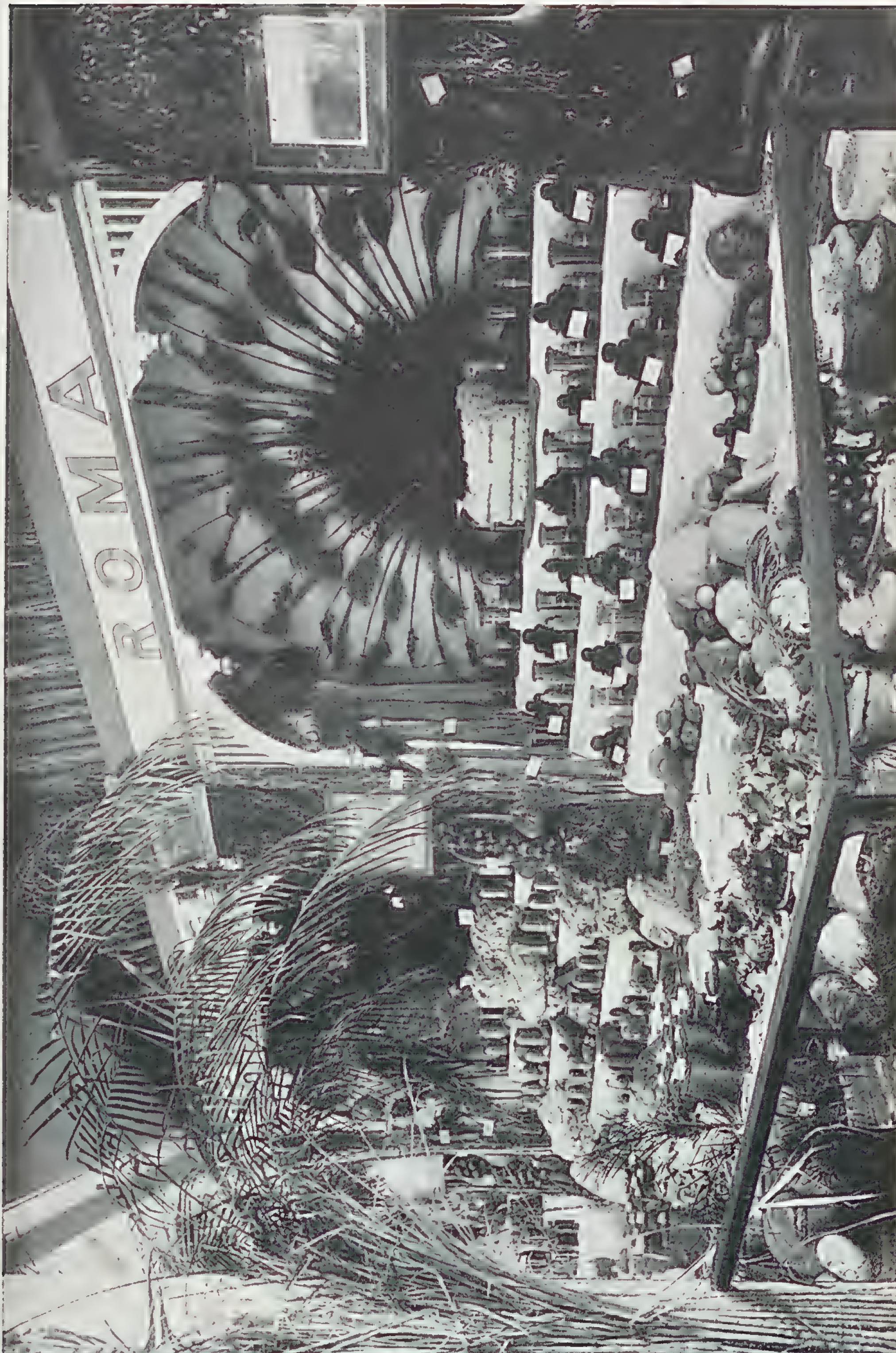
This is the smallest of these institutions, and is situated about 60 miles from Maryborough. Its products are extremely varied, but nearly all are field crops, especially fodder crops, cereals, cowpeas, &c. Here might be seen thirteen varieties of hay, eighteen of chaff, and twenty-one different kinds of cowpeas. The grasses on the farm may be divided into three sections:—First, those selected from a large number of grasses grown in the previous years, which gave promise of being useful, particularly as winter feed; second, those which have not previously been grown on the farm; and, third, those that have passed the small-plot stage, and have been distributed among the natural pastures by means of seed and roots.

Among the grasses shown at the Exhibition in this section were Rib Grass, Red Alsyke and Perennial Red Clovers, White Clover, Sainfoin, Cocksfoot, Canary Grass, Blue, Flinders, and Mitchell Grass, Rhodes Grass, *Paspalum dilatatum*. Some of the grasses were shown dry; others in a growing state. Amongst the sorghums were eight distinct varieties, all of which were well grown. There was also a very fine collection of seeds of various kinds; Sismal Hemp, both in the leaf and scutched; Cotton; Flax; and Soja Beans; also, the Pigeon Pea. An exhibit of ensilage and, amongst fruit, oranges and lemons scarcely completed the long list of economic products from the Burnett district.

Plate VII.

Westbrook, Biggenden, and Combined State Farms' Exhibits at Bowen Park, August, 1911.

Plate VIII.



Roma and Hermitage State Farms' Exhibits at Bowen Park, August, 1911.

ROMA STATE FARM.

Particular interest attaches to the special work carried out there in the way of improvement in our wheats by cross-fertilisation. The peculiarity of the Queensland climate necessitates the production of suitable kinds of wheat, and it is with this object that the work of hybridising is being carried on at the Roma State Farm. The results of this interesting work, when completed, will be embodied in a full report, which will be placed before our readers in due course.

Mendel's theory with regard to the laws of heredity (or Mendelism) is being closely followed throughout the work, and, although very little has been done, the correctness of it is demonstrated in the sameness of the characteristics observed here when compared to those obtained elsewhere.

It will be interesting to read the report on the work now proceeding, which cannot be completed until next year.

Amongst the other exhibits from this farm the following were well worthy of inspection:—Citrus fruits, cowpeas, sorghum, marrows, and pumpkins, oats, ensilage, roots, and cotton.

HERMITAGE STATE FARM.

The exhibits from the Hermitage State Farm consisted entirely of farm crops, and were very varied in character. Of forage crops there were bales of oaten hay, Rhodes grass, Sweet grass (*Chloris virgata*), lucerne, and Phalaris (Canary grass). Amongst the vegetables were fine specimens of Brown Spanish and Yellow Globe onions, turnips, kohl-rabi, leeks, &c. There were 5 well-grown samples of Mazzagua, 7 kinds of sorghum, 7 varieties of cowpeas, 50 varieties of wheat, 5 of maize, and 12 to 15 of introduced grasses, 7 of barley, 3 of millets, and a variety of other farm produce, which go to prove the excellence of the soil in the Warwick neighbourhood. All these were arrayed in a tasteful manner, and the visitors had no difficulty in discovering this and the other State farms, as their locality was clearly indicated above the exhibits in the Departmental Court.

STATE NURSERY, KAMERUNGA.

Amongst the most interesting exhibits at the Exhibition—in fact, the most interesting viewed from the standpoint of Tropical Agriculture—were those of the Kamerunga State Nursery, Cairns, in charge of the Instructor in Tropical Agriculture, Mr. H. Newport. The section was an exhibition in itself, and should prove of great value to the hundreds or even thousands who visited the stand. Our visitors and our Southern settlers know practically nothing about the economic value of such products as were here to be seen. They saw various fibres, kola nuts, coca (*Erythroxylon coca*) from which the cocaine of commerce is made; but they know nothing of the uses to which the leaves are put by the natives of its original habitat, for the purpose of sustaining their energies under heavy exertion. They know what ginger is; but how it is prepared for trade is to them a mystery.

Then, with regard to rubber: To most Queenslanders the rubber industry is a sealed book; but here we had the whole history of rubber unfolded to us, from the seed to the final production of the commercial article, and Mr. Newport made a point of always being present and ready to explain everything and answer all questions which might be asked concerning the multifarious products he had on view. An interesting collection of the singular knives used in tapping rubber trees, with cups

for the collection of latex, served to show how the latex is extracted, and how it is finally turned out in the marketable form. Besides rubber, there was cotton, which is of such enormous importance to pretty well all the inhabitants of the world for clothing purposes, and which can be produced in many suitable districts in Queensland. Vanilla, again, is another product few are acquainted with, except in the form in which it is used in essences and scented soap and many other articles of commerce. Here we saw the beautiful green vine in vigorous growth, and the sweet-scented pod as prepared for the market. Spices of various kinds, pepper, and other condiments were also shown, proving that they can be produced as well in North Queensland as in the West Indies. Turmeric is another of the spices used for various purposes, such as mixing with curry powder, mustard, &c., and for which there is a large demand.

Then, with regard to root crops: We had the cassava, which forms the food of the natives of many countries, who understand how to extract the farina and get rid of the poisonous juice of the root. Yams of various kinds were shown, and it may here be remarked that, whilst in the West Indies, Brazil, Africa, and generally in tropical countries the yam is universally used in place of the potato, and is considered a great delicacy, this delicious tuber is practically unknown in Queensland.

Oils and gums of various kinds were shown, many of the latter being brittle like resin. Drugs also were not wanting in this wonderful collection. The fibres, such as Sisal, Fourcroya, Ramie, and others were shown both growing, or in the harvested leaf or stems, or manufactured. The Ramie or China Grass of commerce is worth to-day £50 per ton. The fibre is enormously strong, and is used in various ways, even for incandescent mantles and in the manufacture of linoleum.

The banana (*Musa textilis*), which produces the Manila hemp of commerce, was here grown in a tub, as well as the cocoanut palm, rubber trees of four varieties, the breadfruit tree (the great standby of the South Sea Islands), Mountain rice, coffee, &c., &c.

THE SUGAR EXPERIMENT STATION, MACKAY,

had a magnificent exhibit of sugar-cane, and cane-growers had no difficulty in recognising many of them, as the different varieties were plainly labelled.

Mackay has ever been the ideal home of the sugar-cane from its first introduction into Queensland; and it was natural that here should be the breeding-place for new kinds of canes, and for all experimental work in connection with the industry. In a future issue of the Journal we will publish a description of the many varieties shown in this section.

DEPARTMENTAL SILOS AND SILAGE.

"The Conservation of Fodder," "Examples of Silo Construction," "Save Your Crops," "Protect Yourselves Against Dry and Severe Winters," "And Make Money." Attention was thus directed by a large and prominent sign to a group of full-sized sectional parts of silos which can be recommended by the department. These examples showed the methods of construction much better than drawings could do, and were confined to the use of cement in some form for interior linings as being by far the most satisfactory material which could be used for such a purpose. Various methods of construction have been experimented with by the department:—Timber framed, with hardwood linings, with sheet-iron linings, with various kinds of bituminous sheets, and with a composite material possessing excellent qualities, but proved to be too brittle and of insufficient strength for the purpose. Sheet-iron linings in some

Plate IX.

Exhibit of Tropical Products from Kamerunga State Nursery, Cairns, N.Q.

Plate X.

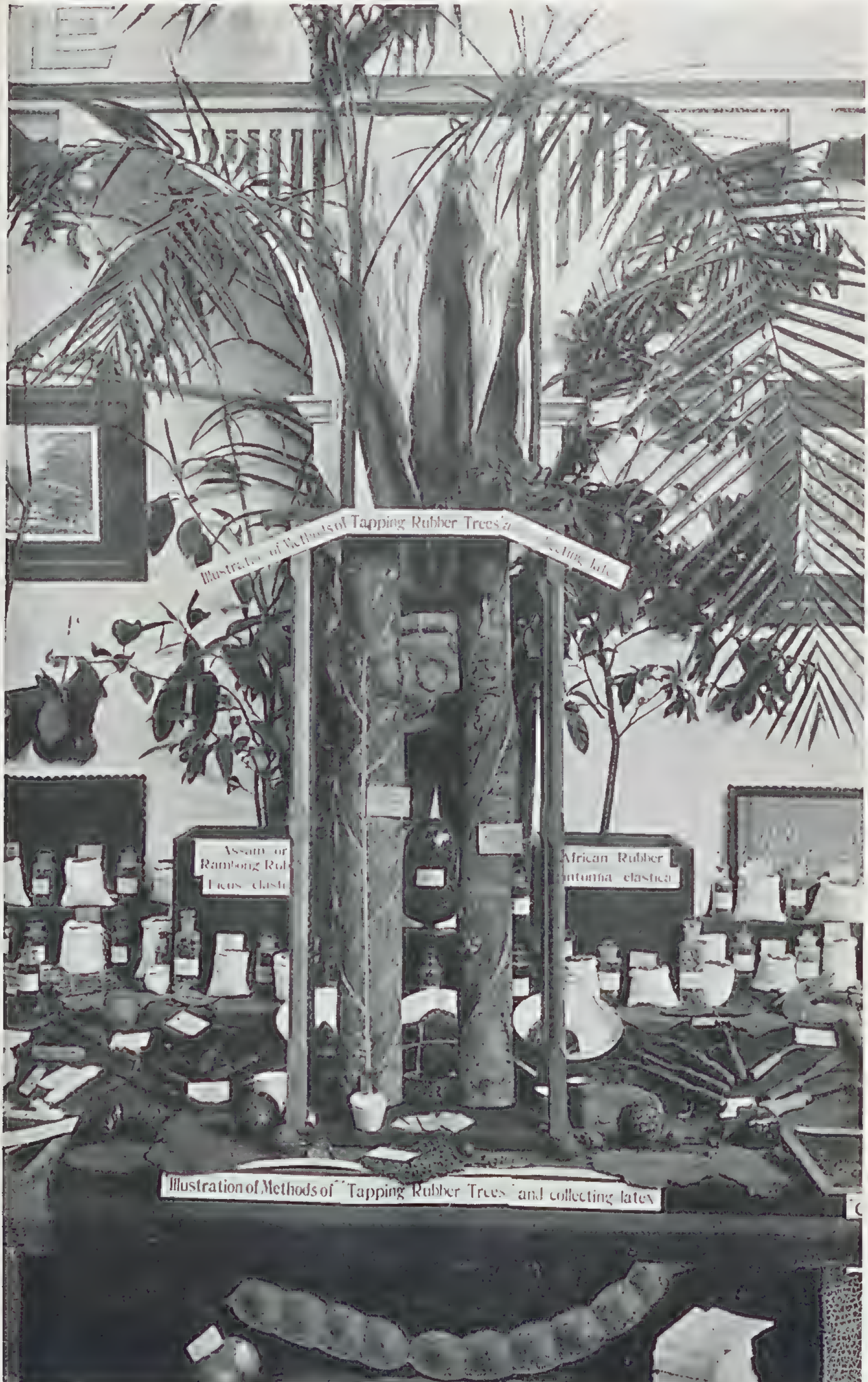


Illustration of Methods of Tapping Rubber Trees and Collecting Latex at the Kamerunga Section at Bowen Park, August, 1911.

cases have been penetrated by rust after twenty months, thus rendering the silo useless; other linings have been so affected by the ensilage juices as to be put out of use in a very short time. These experiments have been useful as demonstrating to the farming community what should be avoided. The technical skill and knowledge of the departmental officers having been directed to this subject, it was at once proved that no material was more suitable for the purpose or more easily adapted to the construction of silos than Portland cement. The manner in which this can be applied was shown in the full-size sectional models. The reason why Portland cement is so well adapted for use in this connection is on account of its practically imperishable character and the ease with which it is manipulated. Composed of 60 parts of lime and 40 parts of silica, alumina, and iron, which during the process of manufacture chemically combine to form silicates and aluminates of lime, on the addition of water, it at once sets into an extremely hard mass, forming hydro-silicates and aluminates of lime, which are practically *indestructible;* thus, when mixed with sand or gravel and broken metal, a material is produced which will endure as long as the everlasting hills. One example showed how Portland cement may be applied in lining a small silo up to 30 or 40 tons, built of curved sheets of galvanised corrugated iron: 12 ft. in diameter by 18 ft. in height will accommodate 45 tons of chaffed ensilage; and if 24-gauge iron is used, strengthened with bands of wrought-iron on the outside at intervals of about 4 ft., joints riveted and soldered as in tank construction, a very excellent outer casing would be obtained. This, however, without lining on the inside, would soon be destroyed by the ensilage juices. How to prevent this was shown in the example. Strong galvanised-wire netting is soldered round the inside, to form a key for the cement compo; the first coat consists of 1 part Portland cement to 3 parts clean river or creek sand (not too fine), with a small quantity of lime putty added to make it more plastic, and a quantity of oxhair or other fibrous material, thoroughly well worked into the mass; before laying this on, the iron should be given a wash of neat Portland cement with ½-oz. of brown sugar dissolved in each bucketful. This will cause it to adhere strongly to the iron. The first coat of plaster as above should then be applied, about 1 in. in thickness, finished off with a fining coat of equal parts of sand and cement. This silo would cost in Brisbane about £45.

Another example showed a method by which ordinary bush slabs may be used for the outer framework, partly sunk in the ground or wholly above ground, placed vertically circular on plan, bound together with bands of iron at intervals of 6 or 8 ft., and lined on the inside with Portland cement slabs 2 in. in thickness, cast in circular moulds with rebated joints, which can be pointed up as the slabs are fixed in position. This will form a very cheap and durable silo, and the cement lining will far outlast the outer timber framing; on fixing the inner cement lining, it would be well to grout in the space between the two linings with cement compo; the cement lining for a 45-ton silo as above would cost in Brisbane about £28.

Still another example showed a method of timber framing, bound together with iron bands at intervals of about 6 ft., sheeted on the inside with steel interlockings, sheet lathing, and coated on both sides with Portland cement compo in the proportion of 1 part cement to 3 parts sand, making a total thickness of 2 in., then finished with a fining coat, ⅛ in. thick on the inside, of equal parts of sand and cement. This also forms a very durable lining, as the steel lathing embedded is protected by the cement from rust. A 60-ton silo of this class would cost in Brisbane about £50.

All timber framing is, however, liable to decay; its durability is governed by numerous conditions; and when the framing is done, the inner lining will not alone stand the strain of the internal pressure; it is also well known, and has been proved by departmental experience, that the best silos are those which have walls of sufficint thickness to withstand the effects of rapid alternations of atmospheric temperature. Silos to be effective must also be perfectly airtight, except, of course, the top, which can be exposed. These conditions are fulfilled to the letter in the reinforced concrete silo, a full-size section of which was on view. This can confidently be recommended as the *best* yet designed; it is absolutely fireproof; ants cannot destroy it; the weather cannot affect it; a hurricane will not blow it over; an earthquake cannot overthrow it; powerful explosives only can in any way move it; once erected, it is practically there for all time; it thus becomes the most economical and effective of all silos.

To encourage its erection by farmers, the department has provided necessary moulds which it is prepared to loan out without charge, except railway freights from and to Brisbane, and on compliance with certain simple conditions; practical advice is also offered by the departmental officers, and every reasonable assistance given.

The concrete is composed of 1 part Portland cement to 6 parts of clean river gravel with a good proportion of sand, or to 4 parts of broken stone 1½-in. gauge and 2 parts sand; any clean stone or gravel is suitable, provided it is not too large. The sand should be sufficient to fill in all the spaces between the stones and a little more. The above material should be properly gauged or measured, and thoroughly well mixed on a good floor, when the moulds are fixed in position, filled in, and well rammed; the walls will be 5 in. in thickness, and can be carried up to any reasonable height. This thickness, however, would be altogether inadequate without some reinforcement, or material added to strengthen it. This is supplied in the form of steel wires bound together in various ways, carried entirely round the structure, and lapped 3 ft. at the junction of the ends without any tying, the cohesion of the concrete itself providing sufficient tie or binding. These wires are calculated to withstand a tensile strain much greater than the internal pressure of the ensilage; the concrete, therefore, is much reduced in bulk and cost, while the strength is considerably increased. Ensilage from these silos is of first-class quality, as it is impossible for air to penetrate at any point; the doors are insulated and made airtight, and the whole structure is of a permanent monolithic character. The cost will depend on the distance from railways, the contiguity of gravel, sand, and metal, and general local conditions. In Brisbane a silo of this character, 17 ft. in diameter, 24 ft. high, containing 124 tons of chaffed ensilage, would cost about £130; the smaller size costing proportionally less. All cement linings may be made entirely waterproof by coating two or three times with a wash composed of 2 lb. soft soap, 12 lb. alum, and 30 gallons water.

DIVISION OF ENTOMOLOGY.

The office of the Government Entomologist and Vegetable Pathologist (Mr. H. Tryon) was responsible for a small exhibit of unique interest, that, whilst it demonstrated the nature and mode of action of typical injurious insects, served also a most useful purpose, in illustrating the many facts connected with these on which methods for coping with them are necessarily dependent. A portion—it may be added—of a much larger collection in process of formation, the present series brought under

notice the more important insect enemies of truck crops, as well as those of the orange and lemon tribe; whilst in a more general manner those of our economic plants generally were displayed, the notorious Fruit Fly and the Maize Moth receiving the fullest treatment.

The special cases shown were as follows:—

1. The Lady-Bird of the Potato (*Epilachna 28-punctata*), in the egg, larva (a spine-bearing "grub"), pupa, and adult phases of its growth; and illustrations of its mode of injuring its food plant.

2. The Flea Beetle of the Potato (*Haltica*). The same; attention being drawn to the leaf-riddling habit of the beetle, and the stem-boring one of its larva.

3. The Potato Miner or Split Worm (*Gelechia solanella*). The same; attention being given to its injuring the Potato and Tobacco plants alike; the caterpillar acting in the *rôle* of a miner in the tuber (potato), a tunneller in the stem, and an excavator between the leaf surfaces ("split worm").

4. The Bean Fly (*Agromyza phaseoli*). The same; the early passage of the maggot from the leaf—whereon the egg is laid—to the stem and down this to the stalk, being noteworthy.

5. The Sweet Potato Weevil (*Cylas formicarius*). The same; emphasis being placed on its destructive action on the root, though also a stem-miner.

6. The Sweet Potato Web Worm (*Bedellia somnolentellae*). The same; showing its peculiar habit—as a caterpillar—of destroying the foliage, by consuming the upper leaf-surface, whilst it fastens these organs together by silken threads, along which it progresses.

7. The Diamond Moth Caterpillar (*Plutella cruciferarum*). The same; the well-known habit of riddling the foliage displayed. NOTE.—This is one of four moth caterpillars that feed upon cabbage-leaves and inflict the injuries so noteworthy in preparing the vegetable for the pot.

8. The Pumpkin Beetle (*Aulacophora Olivieri*). The same; attention being drawn especially to the occurrence of the egg and pupa phase passed in the soil, whilst the larva or grub phase is spent in the root stalk of the plants themselves.

9. Orange-tree Borer (*Uracanthus cryptophagus*). The same; the winding course of its tunnelling and its habit of severing the branch being noteworthy.

11-14. The commoner destructive insects of our economic plants in four cases.

15. The injurious insects of the Citrus tribe of trees, other than the Scale Insects (Coccidæ).

16. The more important Scale Insects of the Citrus tribe of trees, including the Red Scale Insect (*Aspidiotus coccineus*), the Circular Black Scale Insect (*Aspidiotus ficus*), the White Scale Insect (*Chionaspis citri*), the Fulvous Mussel Scale Insect (*Mytilaspis citri*), Glover's Scale Insect (*M. Gloveri*), the White Wax Scale Insect (*Ceroplastes cerifera*), the Pink Wax Scale Insect (*Ceroplastes rubra*), the Black Scale (*Lecanium oleae*), the Long Lecanium (*L. longulum*), the Hemispherical Lecanium (*L. hemisphericum*), the Pale Lecanium (*L. hesperidum*), the Cottony Cushion Scale Insect (*Icerya Purchasi*).

In each case the habit, the life-history and transformations and the outward features of the insect, as seen when freed from its armour (scale) or secreted covering, were portrayed. And, notwithstanding this case did not contain illustrations or specimens of all the Citrus Scale Insects of the State, it discovered features of special significance to those called upon to cope with this class of insects.

17. The Maize or Peach Moth (*Dichocrocis punctiferalis*). This illustrates the characteristics and life-history of an insect of special destructiveness and the great range of economic plants against which this is directed, this embracing Maize and Millet (stalk and inflorescence or head), Cotton (stalk and boll), Orange (fruit), Peach (fruit), Custard Apple (fruit), Guava (fruit), Loquat (fruit), Pomegranate (fruit), Bean (pod), Castor Oil (seed capsules), &c.

18. The Common or Tryon's Fruit Fly (*Tephritis Tryoni*). Its life-history and its injurious relationship to the many fruits to which it is partial were displayed.

19. The Potato Blight and Potato Blight Fungus (*Phytophthora infestans*) in its relation thereto.

These exhibits, although they had been designed by the Entomologist in Chief and illustrate for the most part his discoveries and teaching, were executed by the Assistant Entomolgist—Mr. Edmund Jarvis; and the insect-preparations, drawings, paintings, and models that they comprise were not only exponents of his artistic skill, but of his respect for essential detail.

A MODEL SLAUGHTER-HOUSE OR ABATTOIR.

Much interest was taken in the model of a slaughter-house, placed in the Departmental Court, by Mr. J. F. Chalk, slaughter-house inspector at Maryborough.

This miniature abattoir consists of a large galvanised iron shed, the floor of which is concreted and used for the dressing of stock. At the back are three crushes divided by four sliding gates, the centre one being used as a pithing-pen. In this pen a mechanical contrivance has been placed whereby, after the animal has been pithed, a lever is pulled in the dressing-shed and the carcass is thrown out for the purpose of dressing. The yards are hexagonal in shape, two sides of the hexagon being extended to meet the crush, thus making a small yard adjoining the crushes, and they are placed at each end of the crushes. One is used as a receiving-yard, and the other as an auxiliary yard, the floors of both being concreted. The cattle are placed in the receiving-yard, and a small gate is opened whereby they enter the small yard adjoining the crushes. The crush gates are then opened, the cattle enter, and any particular beast can be picked out at will and the others passed on to the auxiliary yard. The cattle in the auxiliary yard can then be returned, and again any particular animal picked out and slaughtered. The sides of the yards facing the slaughter-house are screened, thus preventing cattle awaiting slaughter witnessing the slaughtering and dressing operations. The features to be observed are: Freedom from molestation and excitement, prevention of bruising, the choice of slaughter of any animal or animals, freedom from dust, and the separation of cattle from bruising by horning.

Plate XI.

MESSRS. ALLEN BROS.' ONE-FARM EXHIBIT, BOWEN PARK, AUGUST, 1911.

FRUIT TROPHY.

A splendid trophy of the fruits generally produced in the State had been artistically aranged near the entrance to the Court. The excellent fruit displayed and its great variety were evidence that, with ordinary care and intelligence, the orchardist here can raise fruit second to none.

ONE-FARM EXHIBIT.

It was expected that there would be keen competition for the £200 to be given for the best display in this section, but only one exhibit was entered, that of Messrs. Allen Bros., Gympie, who displayed a very great variety of produce, animal, vegetable, and manufactures, all the produce of his own farm. This was a splendid object lesson as showing what can be done by energy and perseverance. The £100 prize for the best of the exhibits in this section was doubled in the case of this most deserving exhibit.

HOW TO USE FOWL MANURE.

Hens require a highly nitrogenous ration, for the reason that eggs contain a very high percentage of protein, and one of the constituents of protein is nitrogen. If poultry food is rich in nitrogen, it is natural to suppose that poultry manure must be rich in that element, and so it is. In fact, it is well known to practical poultrymen that hen manure is a very high-grade fertiliser, provided it has been properly preserved. There is, however, no farm manure that decomposes more rapidly than does hen manure, and when it decomposes it loses nitrogen very rapidly. In fact, it is the rule rather than the exception, that hen manure loses fully 75 per cent. of its fertilising value before it is put on the soil. The percentage of nitrogen in hen manure has been found to vary from 7 to 3 per cent., the phosphoric acid from 5 to 2 per cent., and the potash from 25 to 9 per cent. Where a flock of a hundred or more hens is kept a large amount of valuable manure is produced, and it is important to care for this manure in such a manner as to reduce the loss of fertilising constituents to a minimum. A number of substances, which, if mixed with hen manure, are capable of preserving it for a considerable period of time. Acid phosphate and kainit serve a useful purpose in this connection. An American station recommends the following:—Mix with 30 lb. of hen manure 10 lb. of sawdust, 16 lb. of acid phosphate, and 8 lb. of kainit. Mixed in this manner the manure retains its full value from six to eight months, and when compounded according to this formula contains approximately the following percentage composition:—Nitrogen 1¼, phosphoric acid 4¼, and potash 2 per cent. A fertiliser of that kind, if applied at the rate of 2 tons per acre, would be a most excellent one for grass lands or for other agricultural crops. It would also be very valuable for use in gardening, where it is desirable to maintain the soil in a high state of fertility. Land plaster, or calcium sulphate, as it is called, is another substance which keeps hen manure from decomposing and from liberating its nitrogen. Parts of the land plaster combine chemically with the ammonia that escapes from decomposing hen manure and forms a non-volatile substance called ammonia sulphate. This, when applied to the soil, becomes available and capable of serving as plant food. The phosphoric acid and potash, of course, is not lost during the fermentation process. These substances are only lost through leaching.—"Garden and Field."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF JULY, 1911.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
		Lb.		Lb.		£ s. d.
AYRSHIRES						
Lerida	15-2-1911	835	4·9	46·15	1s. 1d.	2 10 0
Lark	22-12-1910	841	4·8	45·50	,,	2 9 4
Lady Margaret ...	4-2-1911	799	4·9	44·16	,,	2 7 10
Rosebud	24-6-1911	904	3·9	39·34	,,	2 2 7
Queen Kate ...	12-12-1910	674	5·1	38·84	,,	2 2 1
Linda	12-2-1911	804	4·3	38·77	,,	2 2 0
Lass	6-11-1910	522	5·1	35·84	,,	1 18 10
College Lass ...	23-8-1910	547	5·3	34·07	,,	1 16 11
Davidina	7-10-1910	553	5·0	31·22	,,	1 13 10
Lavinia's Pride ...	13-10-1910	491	5·1	28·40	,,	1 10 9
Laurette	7-6-1911	526	4·7	27·83	,,	1 10 2
Eleven cows ...	...	7,499	53·1	410·12	,,	22 4 4
Average ...	...	682	4·8	37·28	,,	2 0 5
Lady Margaret, Queen Kate, and Davidina, Imported—First calf.						
JERSEYS.						
Eve	27-6-1911	617	3·9	26·84	1s. 1d.	1 9 1
Cocoa	1-5-1911	445	4·2	20·93	,,	1 2 8
Careless	16-12-1910	369	4·8	19·95	,,	1 1 7
Three Cows ..	...	1,431	12·9	67·72	,,	3 13 4
Average ...	...	477	4·3	22·57	,,	1 4 5
SHORTHORNS.						
Nellie II. ...	30-11-1910	565	4·7	29·90	1s. 1d.	1 12 5
Butter	15-9-1910	435	5·4	26·41	,,	1 8 7
Two cows ...	...	1,000	10·1	56·31	,,	3 1 0
Average ...	...	500	5·1	28·16	,,	1 10 6
LINCOLN RED.						
Bracebridge II. ...	...	383	5·3	23·84	1s. 1d.	1 5 10
Red Rose	1-3-1911	447	4·3	21·54	,,	1 3 4
Two Cows ...	...	830	9·6	45·38	,,	2 9 2
Average ...	...	415	4·8	22·69	,,	1 4 7

Bracebridge II., Imported—First calf.

HOLSTEIN.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
		Lb.		Lb.		£ s. d.
Daisy	2-2-1911	827	3·5	32·09	1s. 1d.	1 14 9

GRADES.

Cow.	Breed.	Date of Calving.	Milk (lb.)	Test.	Butter (lb.)	At per lb.	Value.
							£ s. d.
Lemonade ...	Guernsey-Shorthorn	28-6-11	404	5·4	25·62	1s. 1d.	1 7 9

AVERAGES FOR MONTH OF JULY.

No.	Breed.	Milk (lb.)	Test.	Butter (lb.)	At per lb.	Value.
						£ s. d.
11	Ayrshire	7,499	53·1	410·12	1s. 1d.	22 4 4
3	Jersey	1,431	12·9	67·72	,,	3 13 4
2	Shorthorn	1,000	10·1	56·31	,,	3 1 0
2	Lincoln Red	830	9·6	45·38	,,	2 9 2
1	Holstein	827	3·5	32·09	,,	1 14 9
1	Grades	404	5·4	25·62	,,	1 7 9
20	...	11,991	94·6	637·24	,,	34 10 4
	Average	599	4·7	31·86	,,	1 14 6

Average cow value £1 14s. 6d. for month of July, 1911.

The following cows, namely—Davidina, Lerida, Lady Margaret, Queen Kate, College Lass, Linda, Nellie II., Lark, and Red Rose each received the following daily ration:—20 lb. ensilage and oaten chaff mixed, 4 lb. boiled barley, 1 lb. oil cake, 6 lb. green barley, 3 lb. bran, 2 lb. pollard.

The other cows received daily 25 lb. of chaffed panicum ensilage each and grazed on the natural pasture.

PIG MEALS.

On few matters in connection with pig-fattening does there appear to be greater variability in the opinions of writers than in the question of the feeding value of the different kinds of meals used in the manufacture of pork, and of the increase in the feeding value of various meals by intermixture. A recent author, when writing on this subject, stated his views as follows:—" That, owing to the alleged fact that no investigation in the feeding of young pigs has thrown any light on their requirements, ' we have therefore to fall back upon practice. When the young pigs are capable of taking a sufficient amount of food for themselves, they should be accustomed as quickly as possible to the use of such foods, and their protein constituents should be high. In this respect such cereals as maize and barley have different protein values, and it has been shown that maize alone does not give such a large daily increase of weight as does barley. The same relative positions are maintained when the cereals are mixed with separated milk.' We will leave for a time the question as to whether or not the admixture of separated milk with the maize meal would not to a great extent remedy the defects of the maize as a sole food

for pig-feeding, and proceed to ask the question if either maize or barley can be accepted as a suitable food for young pigs just commencing to eat? Less suitable pig-food could not easily be recommended. It may be asserted that analysis shows that barley, and in a lesser degree maize, should furnish young pigs with the constituents required to build up their frames satisfactorily and economically, but practice and experience prove very clearly that they are most unsuitable. Again, the statement that ' it has been shown that maize alone does not give such a large daily increase of weight as does barley' appears to lack solidity of foundation so far as experiments are available to frunish proof. Amongst these experiments one may be taken as a fair sample. Two lots of five pigs of almost exactly equal weight—208 lb. and 209 lb.—were fed for a period of eight weeks. The one lot consumed 2,832 lb. of barley meal, made a total gain of 601 lb., thus requiring 471 lb. of barley meal for each 100 lb. of increase in live weight. The other lot consumed 3,100 lb. of maize meal, which gave a total increase of 713 lb. live weight, showing that 435 lb. of maize meal gave as good a return as 473 lb. of barley meal; so that with pigs weighing about 40 lb., or some fourteen weeks old, the maize meal, instead of being of less feeding value than barley meal, actually produced about one-thirteenth more live weight. In a trial where rather more than equal weight of separated milk was fed with the maize and the barley meal, the result was somewhat similar. The pigs were nearly twice as old at the commencement of the trial; 1,993 lb. of barley meal and 2,404 lb. of separated milk were consumed for a live weight gain of 604 lb., whereas 1,087 lb. of maize meal and 2,192 lb. of separated milk gave an increase of 591 lb., so that the 100 lb. gain in the former case was the result of the consumption of 330 lb. of barley meal and 398 lb. of milk, whilst in the latter case the 100 lb. increase in the live weight was obtained from 306 lb. of maize meal and 371 lb. of milk, or a reduction of 24 lb. of meal and 27 lb. of milk—something like 8 per cent. In the pamphlet published in Denmark, in which is recorded Fjord's experiments in pig-feeding, much the same results are recorded; but one must in fairness admit that the quality of the pork produced by the use of the barley meal alone would be superior to that manufactured from maize meal alone, yet the cost of the maize meal would be considerably less as a rule. Then, if we pursue the question further, it might be found that the addition of separated milk to the maize meal would equalise matters so far as concerns the quality of the pork. Should this be the fact, then maize meal would prove to be the more economical as a partial food than barley meal. It is acknowledged that some persons persist in pointing out that Lawes' experiments, carried out several years since, conclusively prove that barley meal is the best single food for the manufacture of pork. This is undoubtedly the fact, but it by no means proves that the admixture of certain meals is not far more profitable than any one single meal in the production of pork."—" Live Stock Journal."

Poultry.

RESULTS OF EGG-LAYING COMPETITION, Q. A. COLLEGE, JULY, 1911.

Two thousand two hundred and five eggs were laid during the month, an average of 91.8 per pen. All the birds, with the exception of Mr. Padman's two mentioned last month, are now over their moult. Some of them, however, are very slow in making a start. Mr. J. F. Dalrymple wins the monthly prize with 129 eggs. The following are the individual records:—

Competitors.	Breed.	July.	Total.
Yangarella Poultry Farm	White Leghorns	115	401
J. F. Dalrymple, N.S.W.	Do.	129	384
Range Poultry Farm	Do.	125	383
Alex. Smith	Do.	112	364
E. A. Smith	Do.	121	364
A. Hollings, N.S.W.	Do.	78	343
J. Holmes	Do.	114	343
Cowan Bros., N.S.W.	Do.	118	336
Jas. McKay	Do.	115	323
A. J. Cosh, S.A.	Do.	116	317
Mrs. Kinnear, S.A.	Do.	98	304
A. H. Padman, S.A.	Do.	78	293
H. Hammill, N.S.W.	Do.	85	286
R. Burns	Do.	115	273
J. Gosley	Do.	118	271
S. Chapman	Brown Leghorns	117	270
R. Burns	S.L. Wyandottes	116	237
J. Zahl	White Leghorns	93	232
A. Astill	Do.	70	179
Mrs. A. A. Carmichael	Brown Leghorns	71	153
R. W. Goldsbury	White Leghorns	49	107
J. K. Stewart	White Plymouth Rocks (1)	37	60
J. K. Stewart	Do. do. (3)	6	19
J. K. Stewart	Do. do. (2)	9	9
Totals	...	2,205	6,251

LAYING TESTS WITH DIFFERENT BREEDS OF POULTRY.

UNIV. COLL. OF WALES, ABERYSTWYTH, AGRIC. DEPT., BULL. 1.

In this trial the merits as layers of Buff Orpingtons, Plymouth Rocks, and Partridge Wyandottes were compared. The birds were all hatched in the spring of 1908, and in October ten pullets of the Buff Orpington and Plymouth Rock breeds, and nine of the Partridge Wyandotte were put into pens. The Plymouth Rock pen started laying late in December, and then only produced five eggs in that month, but the other two pens started at the beginning of the month. The records were kept

until 18th March, and the number of eggs laid by each pen in each month and during the whole period are shown in the following table:—

	Dec.	Jan.	Feb.	March, 1st to 18th.	Total.
Plymouth Rock	5	46	110	76	237
Buff Orpington	86	123	127	85	421
Partridge Wyandotte	105	172	138	93	508

The average weight of the eggs of each breed was:—Plymouth Rock, 2.18 oz.; Buff Orpington, 1.91 oz.; Partridge Wyandotte, 1.87 oz.

The pen of Partridge Wyandottes contained only nine birds, while the other two pens contained ten each. Taking this into consideration, it will be seen that in this trial the Partridge Wyandottes were the most satisfactory as winter layers.—" Journal of the Board of Agriculture."

BANTAMS.

From an economic and commercial point of view, the beautiful little Bantams may be said to be of little value, but they are great pets of children, and it has not infrequently occurred that a Bantam has had the distinction of carrying off the prize for " best bird in the show." The Rev. T. W. Sturges, M.A., in his excellent book on " Poultry," has a very interesting chapter on Bantams, from which we take the following extracts:—

Bantams are, at the smaller shows, usually divided into two classes for " Game Bantams" and two for " Variety Bantams"; or two for clean-legged varieties, and two for feather-legged varieties; and sometimes into six classes, in which the game have two for themselves, with two for other clean-legged varieties, and two for the feather-legged.

It is much less costly to exhibit Bantams than the larger breeds. The entry-fee and prize-money are usually the same, but the cost of railway carriage to and from a show is only about one-fourth as much. Three or four Bantams, and the hamper in which they are sent, would not weigh more than one hamper with a large bird.

There is a great charm about these little pets, and although some of the varieties are notoriously bad layers, like their larger ancestors, others give as good a return in eggs, when the diminished cost of housing and feeding are considered, as the bigger breeds, and many a delicate invalid could be tempted with a Bantam's egg who would turn aside from an ordinary one.

Three or four hens and a cock form a decent breeding-pen, and the house to hold them need not be above 3 ft. by 2 ft., while the run necessary to keep them in health may be correspondingly diminished. There is no trouble preparing hot food, since hard corn (wheat and barley) forms their staple diet, in order to keep down the size; and, though they need careful management, they are not half the trouble of the bigger breeds, except at hatching time, when the young are more delicate. Some Bantam hens will hatch and rear their own chickens comfortably, and a bantamised hen of a larger breed will do, but most expert breeders employ the Silkie or a cross of the Silkie and another breed for this purpose. The eggs do not hatch well in an incubator, though it is a common and successful practice to remove the eggs from the hen a few days before hatching, and then place them in an incubator to hatch out—a practice successfully adopted also with the larger fowl, as there is then no danger of the chick being crushed.

One of the chief points for the exhibitor to aim at is, diminished size, the general rule being that a Bantam should weigh *one-fifth the weight* of the original breed, so that when a cock weighs 6 lb. in a large breed, the Bantam should weigh 18 to 20 oz.; and if the hen weighs 5 lb., the Bantam should be 16 oz. Some allowance is made in the newer breeds for extra size, as it usually takes years to get type and size combined into regulation order.

This Lilliputian size is one of the chief difficulties for the breeder, as the very tiny specimens rarely lay fertile eggs, and, indeed, there is considerable danger in their laying eggs at all when the size is diminished below the average, so that many a champion in the show-pen leaves no progeny behind.

When they are kept as pets only, with no intention of showing, they usually exceed the standard weights, but they are more easily reared, unless the other extreme is reached, and the birds are over-fed and too fat.

Most of the Bantams are simply a copy in miniature of the larger breeds—one-fifth, or thereabouts, of the size, and with similar markings and characteristics.

The scales of points, however, differ materially, and, as the newer varieties approach perfection, the scale is amended from time to time, and the way to be "up to date" is either to join a poultry club which fosters the variety, or, at least, to secure the latest standard of perfection issued by the club, and which may vary any year. The Poultry Club Standards are only revised at much longer intervals. In the case of the older and better known varieties, the standard remains permanent.

In all the Bantams it is desirable to breed as small as possible; but type, symmetry, and colour should have the first consideration, and in the order named. It will also be found that, in many of the varieties, head-points count for more than in their larger counterparts—*e.g.*, in Minorca Bantams, defects in comb count 30 points, while in the larger, it is 15; in Leghorn Bantams, 20; in the larger, 12. The reason for this is, that, in breeding the smaller birds, breeds with rose combs, or peculiar combs like the Silkie, have been introduced, and perfect combs are more difficult of attainment. The same general rule naturally applies throughout—viz., that, where any feature is most difficult to obtain, it scores the highest number of points. In no single instance do the points count exactly the same in the larger and the smaller races, although the aim of the Bantam breeder is to produce a copy in miniature. In one case it is size; in the other, shape or colour; in others, wealth of feather is most difficult to attain in foot and shank or tail. It is therefore necessary for the amateur breeder to know which points are most important for the time being, and not to despise a Bantam for a failing which would at once put the larger breed out of court.

Bantam breeders guard their secrets more jealously than any others, and the methods by which the various breeds have been bantamised, and brought to the measure of perfection they have attained, are not the popular possession of the Fancy, and there is no book that goes into the details of the matter.

The most popular varieties are the Game Bantams, the Black Rose-comb, the Sebright and the Pekin in its various colours; though there are many charming minor varieties fast gaining ground, among which the Brahma Bantam takes a foremost place. Of these, the Sebright has no large namesake, and this distinction is shared by other breeds, such as the Booted Bantam and the Japanese.

The *Game Bantam* is a copy in miniature of its elders, and exists in nearly all its varieties. The small size and the fineness of bone are two of its most difficult attainments. The weight for moderns is 20 oz. for cockerels and 24 oz. for cocks; for pullets 18 oz., and hens 20 oz. The various "points" are fairly equally divided between size, type, colour, and feather. Coarseness is a great fault. The feather should be short and the bone light. Shortness and compactness of body with great reach of limbs are essentials. The Black-Reds are the most popular, and a good specimen realises a high figure. Piles are sometimes victorious over the other colours, and are marvels of colour and daintiness. Birchens are more difficult to keep small, but are very attractive, while their counterparts, the Brown-Reds, are as difficult as any to breed true to colour. A good game Bantam cockerel, with its erect carriage, and finely-drawn body, is the daintiest creature imaginable.

Old English Bantams follow the moderns closely in the race for popularity, and, as the good ones are not in as few hands, and are later in origin, they are rising in demand. The Spangle is, perhaps, the most popular. The Black-Reds are very attractive, but for quaintness of colour, the Blue-Reds take the first place. They are as small in weight, but shorter in build, and more bulky in body than the moderns.

Rose-combed Bantams are very popular, especially the black variety. They resemble the Black Hamburgh in style and shape. A good colour, and a wealth of broad sickles are prominent features, while the comb and ear-lobes count for 35 per cent. of the marks. The trimming of Hamburghs' combs, as usually practised, is said to apply with even greater force to the Bantams'. If the patience and skill which are devoted to the manipulation of combs were applied to breeding them, and due allowance made for minor defects for a time, the need for trimming would die a natural death. As it is, a clever faker escapes, and the clumsy hand is penalised, while the novice, and the man who would exhibit his stock as Nature made them, is discouraged. In breeding, great care should be exercised to select a cock that has been *bred* with a good comb, neat in size, square in front, and the top "crowded with little round spikes," which have not been multiplied by the trimmer's dividing knife, nor cut off at the side, where they are apt to overhang. If a trimmed comb would breed its "like," something could be said for it, but where "cut and come again" is so fruitful in a wrong direction, the practice is deplorable. For diminution in size, the smallest hen that will breed should be selected, the cock being the fount of colour and style, and the hen of stamina and size.

The White Rose-comb is very pretty, but not bred so near to perfection, nor so popular as the black.

(TO BE CONTINUED.)

Horticulture.

MANURE FOR THE VEGETABLE GARDEN.

Amateurs are often troubled about what fertilisers to use and how much. The most simple way out of the difficulty is to buy a good general garden manure—one that contains the three ingredients of phosphoric acid, potash, and nitrogen. Now as to quantity, in the first place we have to remember that ½ lb. to the square yard is 2,400 lb., or over a ton to the acre, which is such a very heavy dressing that it could only be afforded on small areas and with intense cultivation. Still, ½ lb. seems a small quantity to the novice, who wants to give that much to each plant. This is not only not necessary, but is an almost certain way to kill or check the plants. If the beds are in good order moderate manuring only is required, and if they are not, two or three light dressings are far preferable to one heavy dosing. In fact, it is a standing rule that plants, like weak children and sick people, are injured, and not strengthened by too much and too strong food.

Many an amateur, in fact, kills his plants with too much strong manure. "I thought I would have a grand crop of lettuces," said a man on the tramcar recently; "I got fine plants and a cwt. of superphosphate, and I put a jamtinful of superphosphate for each plant, but nearly every one died, and the rest are miserable, stunted things." He asked if I could tell him why, and I did. If he had used a small teaspoonful of the superphosphate for each plant and mixed that with the soil for 6 in. all round, he would probably have obtained the results he wished, especially if he had watered them once a week, as they grew, with weak extract of cowdung or fowl-manure.

It is well to recall the fact that there are 2,240 lb. in a ton, and 4,840 square yards in an acre. Therefore, to apply 1 lb. of manure to a yard is equal to over 2 tons 3 cwt. to the acre. A quarter of a pound to the square yard is over 10 cwt. to the acre, and 1 oz. to the square yard is over 2½ cwt. to the acre. It may be roughly stated that it will not be wise to go beyond ½ lb. to the square yard of any artificial manure at one application, and 1 oz. to the square yard of sulphate of ammonia, nitrate of soda, or potash is as much as anyone ought to use.

It must be remembered that the condition of the manure is a very important consideration in deciding how much may be applied. Thus bonedust treated with sulphuric acid is bone superphosphate, or the "dissolved bone" of English writers, and the difference is that in the latter case the phosphate of lime is rendered soluble in water and there is free sulphuric acid present. Now, we might apply 10 tons of bonedust to the acre of cabbages without injuring them. We would simply be wasting the bonedust, but if we applied 10 tons of superphosphate our crop would in all probability suffer. So in the case of stable, cow, sheep, or fowl manures. Too heavy dressings of these substances applied fresh are injurious, but if they are thoroughly well rotted and rendered mellow with age they can be applied in almost any practicable quantities. Then, again, some crops are gross feeders, and will thrive in manure which would kill more delicate plants.—"Garden and Field."

MIGNONETTE FOR POTS AND BORDERS.

We have received some inquiries as to the cause of the failure of mignonette to grow in the open, and our correspondents usually blame the seedsman. Seeing, however, that the seed complained of has been successfully raised in pots, it is evident that the latter is not to blame. The cause must, therefore, be sought for elsewhere. One reason may be that the seeds have been covered too deeply. Another, that the soil is too rich, or that the bed has been too roughly prepared, and the seed has been lost by finding its way deep down amongst rough clods. Sparrows may also be blamed for loss of seed. To succeed with mignonette in the open, the soil must be taken into consideration, although mignonette is not very particular in this respect. Still, the best results will be obtained by choosing a good turfy loam, containing some admixture of lime. Such a soil is good for pots as well as for borders. If some leaf mould is added to a sandy soil, or a little sand to a clayey soil, they will be much improved. For the borders, the soil should be dug deeply, thoroughly broken up, and should any manure require to be added, this must be thoroughly incorporated with the soil, and the surface should be raked very fine, the seeds being scattered broadcast, and covered lightly with fine soil. In dry weather a little watering will be required. If sparrows are troublesome, cover the bed with a piece of fine wire-netting placed some inches above the soil. If it is laid flat on the bed, the sparrows will alight on it and pick up the seeds between the meshes. When the young plants are sufficiently above ground, they must be thinned out, leaving the sturdiest plants to grow until a second thinning becomes necessary, when the plants should be not closer than about 6 in. apart. For pot planting, practically the same method is adopted in sowing, covering the seed and thinning out. There shou'd only be one or at the most two plants left in a small pot, and one or two more in pots of a larger size. Sow during April or during August and September. Tree mignonette must be trained upwards to a stick, the side shoots removed, and when the plant is about 18 in. high it should be topped, when it will throw out side branches.

BLUE HYDRANGEAS.

Few subjects have aroused more controversy than the production of blue flowers on the common Hydrangea. Very occasionally the predominant colour is blue, while in others the blossoms are wholly pink. The change is then put down to the differences in the chemical qualities of the soil. That the presence of iron in the soil causes the blue flowers is an often-expressed opinion, and, by mixing iron refuse from the blacksmith's forge with the soil in which the plants are potted, some cultivators have succeeded in obtaining flowers of a beautiful blue tint. Perhaps the greatest measure of success has been obtained by watering the plants with alum water, but even then that beautiful blue colour to be seen occasionally out of doors does not always result therefrom. The alum should be crushed and dissolved in hot water to the extent of 1 oz. to a gallon of water. This mixture must be given just as the flower trusses show, watering them with it at intervals of eight or ten days, and discontinuing it when the flowers begin to open. It must not be applied when the roots are dry. Though blue flowers are sometimes produced under cultivation, it must be confessed that the why and wherefore of the matter is still a subject for conjecture. A year or two ago a gardener in the hills had a very fine show of blues, but when cuttings were struck a reversion to pink took place.—Exchange.

Tropical Industries.

THE DATE PALM.

Last month, the Hon. the Chief Secretary received from His Excellency the Governor of Queensland, Sir William MacGregor, a report on the cultivation and propagation of the date palm and treatment of the fruit, forwarded to him by His Excellency the Governor General of the Soudan. As the date palm thrives well in Queensland, wherever it has been planted, the Premier sought and obtained the permission of Sir William MacGregor to have the report published *in extenso* in the "Queensland Agricultural Journal." The tables of temperature and rainfall given at the end of the report should be a guide to the most suitable localities for the cultivation of the palm in Queensland.

Soil.—The date palm can be grown successfully on very varied types of soil. A point of importance is that the tree will stand a high percentage of alkali, especially when once established.

Climate.—Special climatic conditions are necessary for its successful cultivation. Rain at the time of pollination is deleterious; high winds and rain when the fruit has formed are injurious, while rain when the fruit is nearing ripeness is still more harmful. A high temperature is necessary to bring the fruit to maturity.

Propagation.—The date palm may be grown either from seeds or from offshoots found at the base of the parent tree. Growth from seed is wasteful since about one-half of the seedlings turn out male. In the Soudan, the date is invariably grown from offshoots. Some natives profess to be able to tell a male from a female seedling by the comparative hardness, &c., of the terminal leaves, but this seems largely a matter of guessing. The distinction can only be made with certainty when the flowering stage is reached.

Seedlings may not breed true to the mother plant, whereas offshoots always breed true. Again, offshoots will stand a higher percentage of alkali in the soil than seedlings.

Propagation by Offshoots.—In Dongola—the chief date locality in the Soudan—offshoots are removed from the parent tree when four or five years old. The actual age of transplanting is not, however, fixed, and would seem to admit of considerable variation.

The following is the process followed in transplanting the offshoots:—A hole is prepared for the reception of the offshoots. The offshoot is removed from the parent tree and all leaves—called "gerida"—are cut off. The offshoot is sunk three-fourths of its total length in the dry ground; its top is tied up with some sacking or palm fibre. Often this treatment is extended to the greater part of the one-fourth above ground. For the first two months the offshoot must be watered daily, but the plant must not be submerged. At the end of this period of watering every five or six days is sufficient, depending on the nature of the soil. When the new leaves are well established less attention is given to watering. The best time in the Soudan for laying out the offshoots runs from June to October. If planting out takes place in the winter the plants seem to "stick" and many die. As regards the distance apart of the offshoots no rule seems to exist in Dongola. In the old groves the intervals between the trees are very irregular but the average distance is

3 to 4 metres. Some official publications of other countries now suggest 25 to 30 ft. as the best distance; probably where the soil is good and irrigation plentiful this distance is greater than need be.

Propagation by Seed.—The seed might be germinated in a nursery or in pots and the seedlings planted out. Males and females cannot be distinguished at this stage, and will be present in approximately equal numbers. Further, many females may turn out inferior and have to be replaced; in consequence, seedlings equal to two and a-half to three times the number of trees eventually desired in the orchard should be laid down. As soon as the males can be distinguished, the surplus over the number necessary for pollination should be removed; further, worthless females as soon as discernible should be eliminated. Closing up, where necessary, should be effected by means of offshoots as soon as available.

Irrigation.—In Dongola, practically no irrigation is given to date plantations pure and simple. In gardens or cultivated land the trees get a certain amount of water when the surrounding crops are irrigated. Further, the groves lie mostly near the bank of the Nile, and in consequence the roots can always reach water. During Nile flood the soil is thoroughly soaked by infiltration, while occasional stretches are irrigated by direct flooding from the river. The rainfall in Dongola is negligible.

Undoubtedly the trees in Dongola would in most cases yield more heavily were the irrigation more plentiful. The fact remains, however, that once well established the date can get along with little water.

Pollination.—In Dongola, artificial pollination is always resorted to, each tree being carefully treated. One male is considered sufficient for a hundred females. The method is briefly as follows:—An incision is made in the spathe of the female flower when nearly opening; a male twig containing pollen is inserted and tied in place by a piece of cloth or a palm leaf. Pollination takes place in February and March.

Pollen is frequently kept over from one year to the next and proves quite effective. Such a precaution is, however, unnecessary, there being, as a rule, a sufficient supply every year.

Picking and Curing.—Seven months after pollination the fruit is ripe, and picking takes place in September and October. In the case of dry dates the ripe bunches are cut off and thrown to the ground. The dates are then picked off separately. The fruit is now spread in the sun for ten or twelve days, and at the end of this period packed in sacks, ready for sale. For the Soudan dry dates—*e.g.*, Gondela and Barakawi —no further treatment is necessary.

Soft dates are either picked in the tree or the ripe bunch is cut off, thrown to the ground, and the dates picked. The fruit is exposed to the sun from morning till afternoon, and the same evening is packed in special earthern "zeers" (jars) and pressed down by hand. A piece of clean cloth is placed on top, then a wooden lid, and the lid is sealed with mud to exclude air. Old zeers are considered best, as there is less chance of air getting in at the sides. After three days the mixture is taken and exposed to the sun for the day. Before nightfall it is packed in again as before. This process is repeated four times. The product is known as "agwa." In this there is a small local trade, and the "agwa," packed in old paraffin tins, sells for as much as 40 to 50 Paras per tin (1 Para = 2½d.).

In the Soudan practically the whole trade is in dry dates which require little trouble in curing and packing.

Yield.—In the Soudan a very good tree well watered will give at most one ardeb—equal to 320 lb. (approximate). This, however, is exceptional.

An average yield from well-matured trees suitably irrigated in this country would be rather under ½ ardeb.

Varieties.—The most profitable Soudan varieties are Gondela, Barakawi, and Bertamoda. The two former are dry dates; the latter can be treated as a soft or a dry date. The whole of the Soudan trade practically is in the two varieties first mentioned.

An ardeb (300 to 320 lb.) of Bertamoda will fetch as much as 192F. (1 Fuddah = $\frac{1}{16}$ d.). There is not much trade in this variety, however, as the quantity is limited.

An ardeb of Gondela will give 100 to 120F., while the same quantity of Barakawi will bring 72 to 96F. The Degletel Nur palm has recently been introduced into the Soudan and is promising. It has been introduced in California by the United States Department of Agriculture, likewise, it is understood, with encouraging results. Probably this is the best all-round commercial variety.

Transport of Offshoots.—In the Soudan the following is the method:—The offshoot is removed from the parent tree; all leaves are cut off; the bare stem is wrapped with halfa grass or palm fibre, then with old sacking, and tied up with rope. The plants so wrapped up are sprinkled with water every other day. So treated they are known to bear transport for three months. It may be noted that when the United States of America Department of Agriculture transported offshoots from Algeria only two waterings were given during a period of two months and 80 per cent. of the shoots survived; so that watering to the extent aforementioned would not appear necessary.

Offshoots of the Soudan varieties treated as above described could be placed at Port Soudan at a cost of 5P. each = 1s. approximate.

Rainfall and Temperature Records.—Appended are two tables, showing the rainfall and temperature for Merowe (in Dongola) and Khartoum for the years 1907 and 1908, which may prove handy for reference. These tables are extracted from the Meteorological Reports of the Egyptian Survey Department for the years in question.

It may be noted that in the Khartoum locality the date fruit is apt to suffer from the rainstorms and high winds which frequently occur in July and August.

Official Publications.—No official publications on date culture have been issued by the Soudan Government, but the following, which may be readily obtained, are noted:—

(1) The Commercial Products of India, by Sir George Watt.

(2) Dictionary of the Economic Products of India, by Watt.

(3) The Date Palm and its Utilisation in the Southern States, by Walter T. Swingle, U.S. Department of Agriculture, Bureau of Plant Industry, Bulletin No. 53.

(4) Persian Gulf Dates and their Introduction into America, by David Fairchild, U.S. Department of Agriculture, Bureau of Plant Industry, Bulletin No. 54.

(5) Experiments in Cultivation of Dates, in "Agricultural Journal of India," 1906, by Sly.

(3) and (4) may be obtained by application to Superintendent of Documents, Union Buildings, Washington, D.C.

(5) may be obtained through the Inspector-General of Agriculture in India.

TEMPERATURE AND RAINFALL AT KHARTOUM IN 1907 AND 1908.

—	Temperature (Centigrade).					Total Rainfall in Millimetres.
	Mean.	Mean Maximum.	Mean Minimum.	Absolute Maximum.	Absolute Minimum.	
YEAR 1908—						
January	20·8	30·5	13·8	39·2	5·2	.
February	22·3	32·4	14·6	38·0	6·9	...
March	27·7	38·0	19·9	43·3	13·0	...
April	31·2	41·3	22·9	46·0	15·6	...
May	32·5	41·1	25·2	44·1	19·8	...
June	33·0	41·3	26·5	44·7	23·8	0·7
July	29·4	35·8	24·6	39·5	22·0	72·7
August	30·1	36·8	25·2	40·7	21·4	45·4
September	31·1	38·3	25·7	41·5	22·0	24·2
October	31·1	39·3	25·1	41·4	22·0	11·4
November	26·8	36·1	19·5	39·4	16·3	...
December	23·1	32·9	15·8	35·6	11·4	...
YEAR 1907—						
January	23·2	33·3	16·0	38·6	7·7	...
February	24·8	35·5	17·2	41·2	12·5	...
March	26·9	37·7	19·0	44·0	13·4	.
April	30·8	40·6	23·2	45·3	15·7	.
May	32·4	41·3	24·6	43·7	20·4	...
June	32·9	41·4	26·1	43·2	23·0	0·2
July	30·3	37·5	25·0	43·1	21·0	13·5
August	27·4	34·0	23·3	39·3	19·7	186·4
September	31·2	38·8	25·6	41·2	21·1	11·8
October	31·2	39·7	24·7	42·4	21·2	...
November	25·7	34·8	18·6	39·2	14·6	...
December	21·8	31·2	14·7	36·0	11·4	.

TEMPERATURE AND RAINFALL AT MEROWE (IN DONGALA) IN 1907 AND 1908.

—	Temperature (Centigrade).					Total Rainfall in Millimetres.
	Mean.	Mean Maximum.	Mean Minimum.	Absolute Maximum.	Absolute Minimum.	
YEAR 1907—						
January...	19·8	30·5	8·4	37·5	0·7	.
February	21·4	32·0	11·4	40·7	6·3	..
March	24·2	34·5	16·0	42·3	10·5	...
April	29·5	39·1	21·0	45·7	16·2	..
May	32·6	41·7	23·9	44·7	18·1	...
June	33·8	42·8	25·9	45·7	22·0	..
July	33·7	42·0	27·4	45·5	24·0	...
August	31·7	39·4	26·8	42·4	23·7	...
September	34·0	42·6	27·0	45·7	24·5	...
October	31·0	40·0	23·1	43·9	18·5	..
November	24·2	33·6	16·3	39·7	12·0	...
December	19·4	28·7	11·7	34·2	6·1	...
YEAR 1909—						
January...	18·9	28·1	11·7	36·7	5·5	...
February	20·2	30·8	12·6	38·9	5·5	...
March	25·6	36·3	17·7	43·5	12·0	...
April	29·9	40·1	21·7	46·0	16·4	...
May	31·7	40·6	24·4	45·7	19·0	..
June	33·1	42·8	22·6	46·6	15·8	...
July	31·0	40·5	20·8	43·0	17·6	...
August	32·0	41·4	21·8	43·6	17·5	...
September	32·1	42·3	21·8	45·0	19·0	...
October	29·7	40·3	19·2	43·6	12·7	...
November	24·5	34·4	17·0	38·5	11·0	...
December	20·6	30·3	13·1	34·9	8·0	...

Plate XII.

Sesamum in the Field at about 3½ Months Old.

Sesamum.
On the left, Ripe Capsules containing Seed; on the right, Dry Capsules that have discharged the Seed; in the centre, Seed and Flowering Spray.

Plate XIII.

Sesamum ready to Harvest at the Kamerunga State Farm, Cairns.

SESAMUM (Sesamum Indicum. Linn).

By HOWARD NEWPORT, Instructor in Tropical Agriculture, Cairns.

As an addition to the interesting article quoted from the "American Review of Tropical Agriculture" in the "Queensland Agricultural Journal" for March last (Vol. XXVI., page 141), and in some ways as a set-off to the somewhat eulogistic figures, &c., quoted as obtained, or obtainable, in Mexico, the following references may be of interest, previous to a record of the results of experiments and plantings of this oil-producing seed plant in tropical Queensland:—

SESAMUM IN AFRICA.

The following is an extract from a report by the Curator of the Botanic Station, Kotu, Gambia, in the Kew Bulletin:—

Beniseed (*Sesamum indicum*).—Two acres of land were placed under cultivation during the last rainy season with seed of this plant. It has grown exceedingly well. Seeds have been distributed to the Head men in British and foreign Combo, but so far I have not heard whether the seed was utilised. The return of the crop grown on 2 acres at the Station from 85 lb. of seed was 784 lb., being nearly tenfold. There is said to be a ready demand for beniseed, and if grown in large quantities there would be a profitable return. The land was first ploughed by the oxen, then the seed sown broadcast and harrowed in. The crop was cut just before the seed vessels burst, and the plants were tied in bundles and placed on Run leaves to dry in an upright position. The seed was caught as it was expelled from the capsules. By shaking the bundles the seed is readily removed. The dry stems are then packed into a heap, and burned, so that the ash may be returned to the land as manure.

The "Run" leaves alluded to are the leaves of the *Borasus flabelliformis,* which is known in Gambia as the "Run" Palm.

SESAMUM IN INDIA.

The following extracts from the text-book on Indian Agriculture by J. Mellison, M.R.A.C., is also of interest:—

Sesamum or Gingelly Oil seed (*Sesamum indicum,* Linn.).—Cultivation in Kaira . . . . . . The crop is not exhaustive. The field should be got ready by repeated ploughings and harrowings during June, July, and August. This tillage should produce a perfect state ot tilth and at the same time a tolerably firm seed-bed. The seed should be drilled. In the Deccan a four-coultered drill is used, and the rows are about 13 in. to 14 in. apart; ¾ to 1 lb. seed is sufficient seed rate. The seed is small, and, to secure even distribution, should be mixed before sowing with finely powdered dry cowdung manure or ashes. *Til* likes a firm seed-bed. The seed should be sown shallow and covered lightly with a brush harrow made of *babhul* branches. In sowing *Til* the iron shares should be removed from the coulters of the drill to lessen penetrating power. The seed germinates slowly and often irregularly, unless the soil moisture is sufficient. Heavy rain after sowing is usually disastrous, and cloudy weather, when the plant is in flower, does harm. The crop only needs light showers and a retentive soil to bring it to maturity. It i, however, like some other oil seeds, a delicate crop to grow. Superfluous seedlings should be thinned out, and the crop hand-weeded once and bullock-hoed twice. If sown in September, the crop is ready in January. It is ripe when the leaves turn yellow and capsules get mottled with black spots. Sometimes patches in the field, especially if the soil is variable, ripen prematurely. Such patches must be harvested as they ripen. If the plants get over-ripe, the capsules open, and the seed is certain to be lost before the crop reaches the threshing-floor. . . . . It is best to harvest the plants by uprooting. They should, as they are uprooted, be shaken over a large cloth spread in the field behind the harvesters, and moved from time to time as required. Thus the seed from such capsules as have opened is collected. The plants should be bound into small bundles, and carted the same day or the following day to the threshing-floor. The bundles should be stooked up on their root ends close together on the threshing-floor. In the course of ten days or a fortnight the capsules will ripen and open through the effect of sun and wind. The capsules will empty themselves by inverting each bundle and gently beating it with a stick. This may have to be repeated once or twice at intervals of a few days, especially if all the plants were not equally ripe

when harvested. In any case the threshing of the crop is an inexpensive and simple process. The winnowing or cleaning of the seed is not quite so easily accomplished. It is partly effected by means of wind in the ordinary way, but the seed being light requires a good deal of sifting or winnowing to clean it properly.

A crop experiment taken in the Surat district in 1895-96 gave the following outturn, &c., results from a good average crop:—Seed rate, 1 lb.; outturn of oil seed per acre, 372 lb.

In Khandesh a good crop yields from 320 to 360 lb. per acre. The seed is usually worth from 15 to 18 lb. per rupee, white seed being dearest. White *Til* on account of its pure colour is prized for the preparation of sweetmeats. *Til* cake is worth 35 to 45 lb. per rupee, and is an excellent feeding cake.

The prices given above correspond to £9 6s. 8d. per ton for the seed (at 16 lb. per rupee), and £3 14s. 8d. per ton for the oilcake (at 40 lb. per rupee).

The returns per acre obtained at the Government Farm, Surat, on good ordinary black cotton soil, is given at 454 lb. per acre.

Three varieties grown at the Poona Government Farm were found by Dr. Leather to have the following analysis:—

	White Seed.	Black Seed.	Red Seed.
Moisture	4.87	5.42	5.37
Oil	48.13	46.50	46.20
Albuminoids	22.50	25.81	21.03
Mucilage, &c.	14.05	9.06	15.87
Woody fibre	4.49	6.52	4.18
Ash	5.96	6.69	7.35
	100.00	100.00	100.00
Containing nitrogen	3.60	4.13	3.37
Containing sand	.37	.66	1.35

These varieties were sown in adjoining plots on the same day—21st June. They ripened as under:—

White Til	14th October.
Red Til	2nd November.
Black Til	19th November.

CULTURAL INFORMATION FROM OTHER COUNTRIES.

A careful comparison of these results is well worth the while of the student or intending grower. The difference between these now quoted and those from Mexico in the last article in this Journal above referred to are remarkable not only in the method of sowing, harvesting, and general treatment accorded the staple, but in the outturn and return. I will allude to this point later in comparing the returns per acre obtained in Queensland, but these differences will serve to illustrate the danger of relying on figures and reports of the results of either experiments or field operations in countries, and under conditions, different to our own.

The very dry climate of a great portion of the year, the heavy monsoonal rains of the other times, and the generally poor soils in which as a result the Sesamum or Til crops are grown in India, probably account in some measure for the poor returns as compared with the better soils and climatic conditions of Central America.

Generally, therefore, it will be found that while development and ripening is slower, the size of the plants less, and the returns per acre lower under the less favourable soil and climatic conditions, the oil content is higher, and *vice versâ* under the more favourable conditions of growth, which is fully borne out in the foregoing.

On the whole the methods employed and the advice tendered from India is far nearer to our requirement and far more applicable to our

conditions than those from Mexico, to follow which in detail would be out of the question if not actually disastrous in North Queensland, as will be shown. Very seldom can the reports and statements from any other country be followed exactly, and such are apt to be exceedingly misleading, unless, as in the case of soil analysis, plant pathology, or economic entomology, the reader fully understands the conditions governing the results quoted; and then the information so obtained can only be made use of as a guide, never as a text.

(TO BE CONTINUED.)

COPRA DRYING.

The "Tropical Agriculturist," Ceylon, publishes the following notes on the above subject, which is of considerable value and importance to growers and intending growers of cocoanuts in Queensland. The writer is apparently a resident in the Philippines:—

"For the past month I have been trying to learn a few things about cocoanuts and have been carefully reading your excellent book 'All about Cocoanut Planting,' 1907. Have you a later edition of this manual?

"In the Philippines the fresh kernel of the cocoanut is dried either by the heat of the sun or by a smoking fire. Do you know of planters who are using a better system?

"During the first three months of this year 44,000,000 lb. of copra were exported from the Philippine Islands, and 7,000,000 lb. of fresh beef were imported from China, Hongkong, and Australia. It seems to me that there is something wrong with this custom of purchasing cattle and selling cattle food? I refer to the poonac in the copra. Are oil mills in Ceylon or India operated at a profit? Possibly your next 'Cocoanut Manual' will have all of these problems solved."

The annual export of copra from the Philippines—nearly 400,000 cwt. in three months—is probably four times the export of Ceylon. But we export 600,000 cwt. of cocoanut oil (apart from poonac, desiccated product, nuts, and coir)—a sufficient answer to the question if oil mills in Ceylon are profitable. There is no end to the mysteries of trade; it may be advantageous to import food articles, even cattle, in the Philippines as it is in Ceylon, where the pasturage is poor, and to grow and export the tropical produce. What does our correspondent think of Ceylon (which was a great rice-growing country, 2,000 years ago) now paying over £2,000,000 sterling to India every year for rice? But India takes much from Ceylon: Cardamoms, cocoanut products, arecanuts, essential oils, &c. Our correspondent has the latest edition of our "Cocoanut Manual"; but another will, no doubt, be called for later on. As to the drying of copra, sunheat where available is preferable, and accordingly in dry hot districts—such as Cochin and Batticaloa—the copra is sometimes preferred than that from comparatively wetter districts of South-west Ceylon. But our correspondent ought to read the opinions of three veteran cocoanut planters to whom we sent his questions. First, here is an answer from Negombo district:—

"I am not aware that any other system of drying copra is practised in the island than the time-honoured methods of sun-drying and grill-drying. The former is the simpler, as it is the slower mode and produces a good quality of copra. During rainy weather, or a succession of cloudy days, the halved nuts are laid on a grating of arecanut laths,

below which a fire of cocoanut-shells is kept constantly burning. This process, although it is cheap and comparatively rapid, tends to form a hard, burnt coating over the surface of the nut, darkening the copra and imparting to it a smoky taste and smell. In Trinidad, hot-air driers are used and they are stated to be better than any other apparatus employed there. It is a question whether it would pay to feed cattle for slaughter on expensive oilcakes. Oil-mills in Ceylon and India are, I suppose, worked at a profit."

Then we have two answers from districts east of Colombo, and first we are told:—

"So far as we are aware, planters and copra-driers have not departed from the old methods. In dry districts exposure to the sun during the day, and heaping up at night, is the usual routine—we should say was, because fire-drying is resorted to, even there, more frequently now. For smoke-drying, cocoanut-shells, which scarcely smoke, while giving out a maximum of heat, are the material used. The loft, with arecanut laths ½ in. apart, 5 ft. to 6 ft. above the floor of the drying-shed, is heaped two or three deep with the split nuts, while the shells are fired under, fitting into each other, in rows 4 ft. or 5 ft. apart. The result is perfectly white and clean copra in three days, of two fires each day."

The amount of copra sent to Great Britain during the past fifteen years ending with December last, the eight countries—Java, Macassar, Sangir, Menado and Gorantalo, Padang, Singapore and Penang, Ceylon, Manila and Malabar—contributed no less than 3,277,277 tons, the greatest of all being the Philippines with their 828,613 tons, while Ceylon sent 362,651 tons and Malabar Coast only 64,503 tons, a mere "drop" in the copra ocean.

No doubt the same process obtains generally, viz.: The ripe nuts are plucked and allowed to wither, or mature, the best part of a month; then they are simply cut in two and either sun or fuel dried, it being a well-known fact that with regard to Ceylon the best is made at Kalpentyn, some 20 miles north of Puttalam, where they have very little rain and where they place the newly-opened nut in the sun on the hot sea sand, this process being unequalled elsewhere; although I must say our best estate copra runs it very hard; in fact it often fetches the best price in our market.

All over Ceylon the common copra kiln is used when there happens to be no sun, the fuel used being the cocoanut shells which leave the kernel after a couple of days' good drying in the sun, or over the fire in the kiln.

NEW TYPES OF EGYPTIAN COTTON.

In the course of a lecture on cotton-growing before the State school teachers at the Queensland Agricultural College last July, by the Editor of this Journal, the lecturer announced that the Department of Agriculture and Stock had imported seeds of the principal varieties of cotton grown in Egypt, and had distributed them to some of the State Farms, to Kamerunga State Nursery, and to Messrs. Joyce Bros., of the Ipswich cotton-mills. These varieties were described in detail, and it was hoped that when the seed has been planted and more seed is available the teachers would obtain some and experiment with it.

We have since received an account (published in Bulletin No. 200 of the Bureau of Plant Industry of the United States Department of Agriculture) of the results of work connected with the breeding of new types

of Egyptian cotton in the United States, of which the following is a summary:—

"The Somerton variety resembles the preceding in the length of its bolls, and in most of its fibre characters, but the bolls are more sharply pointed, the seeds generally smoother, the percentage of lint smaller, and the plants more bushy, with a greater development of large vegetative branches. The group of strains, Nos. 360, 361, and 362, constitutes a uniform type that is very different from the Yuma and Somerton varieties. The plants are of open habit, with several large limbs, nearly equalling the main stem; short, plump, abruptly pointed bolls; and strong fibre of medium length (averaging 1¼ to 1⅜ in.). In colour the fibre is almost as brown as that of imported Mit Afifi. Other more or less distinct types have been developed, but are either less satisfactory, or have not yet been sufficiently tested. Imported seed of the principal Egyptian varieties was planted in 1909 in Arizona, in the vicinity of Yuma and at Sacaton. The varieties differed greatly in the amount of individual diversity manifested. None of them equalled the acclimatised stocks in fruitfulness or in quality of the lint.

"Progenies of a number of first-generation Egyptian-Upland hybrids were grown near Yuma. The second-generation plants showed excessive diversity of type, but none of them could compare with the first-generation parents in yield or in excellence of the fibre. The imports of cotton from Egypt into the United States during the calendar year 1909 amounted to 72,617,893 lb., valued at 12,101,000 dollars (£2,420,200), as compared with 61,511,723 lb., valued at 11,560,009 dollars (£2,312,001), in 1908.

"Several distinct and promising varieties and strains which have resulted from the acclimatisation and breeding experiments with Egyptian cotton in the south-western United States were tested on a field scale in the Colorado River region in 1909, and gave very favourable results in regard to the quality and uniformity of the fibre produced. The results of the season's work showed that by planting carefully selected types, and by 'roguing out' the markedly aberrant individuals early in the summer, the degree of uniformity can be attained which is demanded by the market for this class of cotton. Diversity can be still further controlled, and the fruitfulness of the plants maintained, by avoiding extremely light and extremely heavy types of soil, and by managing irrigation so that the plants are not exposed to alternations of severe drought and excessive moisture. Samples of the fibre produced in 1909 were submitted to a number of spinners and other experts, who were unanimous in pronouncing them equal in all respects to imported Egyptian cotton of corresponding grades. Two of the best types (the Yuma and Somerton varieties) are so distinct from the Mit Afifi variety from which they have been derived as to warrant the belief that they are mutations and have originated in the same manner as Abbasi, Jannovitch, and other superior types which have been developed in Egypt from the Mit Afifi variety. A third type (strains 360, 361, 362) resembles Mit Afifi in all characters of the plants, bolls, and fibre, but the plants are much more productive, and produce fibre of better quality than those grown in the same region from imported seed. This type is to be regarded as an acclimatised and improved Mit Afifi rather than a new variety. The Yuma variety was tested in a field of 4 acres near Yuma, Arizona, in 1909, and showed a very satisfactory degree of uniformity in the productiveness and habits of the plants, and in the quality of the fibre. It is characterised by a strong tendency to develop a stout main stem, greatly surpassing the limbs, and possesses long fruiting branches, long taper-pointed bolls, and strong, silky, cream-coloured fibre, averaging about 1⅜ in. in length."

CENSUS OF RUBBER MANUFACTURES.

The outputs of rubber factories and workshops in the United Kingdom given in the "Census of Production" for 1907, just issued as a Blue Book (says "The Rubber World") are significant if only because they show that four years ago tires accounted for no more than one-third of the rubber business of the country. Possibly in the interval it has assumed a larger proportion, mainly because the motorist has not been wholly deterred by the increased prices which have had their effect in other directions. At the same time, we must remember that the drop in price of the raw material followed sharp on 1907, and this may have affected the output of rubber manufactures to an extent which will be revealed in 1908 and subsequent years. The dimensions of the trade in 1907 are shown in the following statistics:—

	Value.
Solid and insertion sheet rubber (including matting, valves, washers, rings, rubber springs and all articles for mechanical and industrial purposes)	£1,501,000
Tires and tire-covers (for carriages, cycles, motor vehicles, &c.) :—	
Pneumatic	2,260,000
Solid	513,000
Total—Tires and tire-covers	£2,773,000
Waterproof piece-goods, garments, boots, shoes and slippers, not separately distinguished	£1,281,000
Waterproof garments	284,000
Rainproof garments	46,000
Elastic thread, cord, &c.	446,000
Sports requisites and toys (including golf and tennis balls, other balls, &c.)	473,000
Hose and tubing of rubber or of rubber and other materials	508,000
Rubber heels	314,000
Hot water and air goods, medical, surgical and dental appliances	180,000
Machinery belting (including Balata belting)	118,000
Miscellaneous rubber goods	572,000
Waste and reclaimed rubber	130,000
Rubber substitutes and compounds	51,000
Engine packings	34,000
Other products	97,000
Waterproofing done on commission	85,000
Repairs to tires, &c., &c.	15,000
Total value	£8,908,000

From the above, it will be seen that in 1907 the value of the rubber utilised in various ways was about one-fifth of that of the total world's rubber output for 1910. This amounted to 80,000 tons, made up as follows:—Brazil, 38,270 tons; the Mid-East, 8,000 tons; and Africa, 18,000 tons; the balance of some 16,000 tons being credited to the production of Guayule and Jelutong; and considering the activity of the United Malaysian Company, and the dividend, 14 per cent., paid on its large capital by the Intercolonial Rubber Company, the American

Corporation, which is the largest owner of Guayule concessions, this estimate seems to be fairly conservative. We therefore have the rubber outputs of Peru, Bolivia, Ecuador, Mexico, and the Guianas unaccounted for. These countries, it seems to us, should be able to show another 10,000 tons of rubber, bringing the world's total to 90,000,000 tons, which, considering the enormous and growing consumption of rubber, would seem to be a more likely figure.

The whole of this rubber, including Parà, Ceara, Castilloa, Nambong, and scrap, would perhaps average 4s. 6d. per lb. Taking the output at 90,000 tons, the value would amount to £45,360,000, so that between the years 1907 and 1910 the rubber trade expanded to the amount of £31,412,000. During 1910 the price of rubber was abnormally high, Parà, Fine Plantation Crêpe rubber ranging from 8s. 6d., 10s. 10d., to 12s. 4d. per lb.

WHEN RUBBER IS AT ITS WORST.

The "Rubber World" publishes the estimates of two rubber companies, Highlands and Lowlands, and Selaba, as to their respective futures, as follows, and these show that even at 1d. per lb. profit, the former will pay 5 per cent. and the latter 6 per cent. This should be encouraging to those who are turning their attention to rubber planting in Queensland:—

HIGHLANDS AND LOWLANDS.

Capital, £310,000. Planted area, 3,769 acres; reserve land, 4,368.
Capitalisation per planted acre, £82.

					Dividend.
1911	..	Rubber (650,000 lb.) 2s. 6d. profit.	.. £81,250	=	26 per cent.
1912	..	Rubber (950,000 lb.) 2s. profit.	.. £95,000	=	30 per cent.
1913	..	Rubber (1,300,000 lb.) 1s. 6d. profit.	.. £97,500	=	31½ per cent.
1914	..	Rubber (1,700,000 lb.) 1s. 3d. profit.	.. £106,250	=	34 per cent.
1915	..	Rubber (2,100,000 lb.) 1s. profit.	.. £105,000	=	34 per cent.
1916	..	Rubber (2,500,000 lb.) 9d. profit.	.. £83,750	=	27 per cent.
1917	..	Rubber (2,750,000 lb.) 6d. profit.	.. £68,750	=	22 per cent.
1918	..	Rubber (3,000,000 lb.) 4½d. profit.	.. £56,250	=	18 per cent.
1919	..	Rubber (3,200,000 lb.) 3d. profit.	.. £40,000	=	13 per cent.
1920	..	Rubber (3,400,000 lb.) 3d. profit.	.. £42,500	=	13½ per cent.
					249 per cent.

If ultimately Highlands and Lowlands produces only 3,700,000 lb. and sells at 1d. per lb. profit it will pay .. .. 5 per cent.

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SELABA.

Capital, £125,000. Planted area, 2,346 acres. Capitalisation per planted acre, £53.

			Dividend.
1911 ..	Rubber 56,000 lb. forward sales at average 4s. 6d. profit..	£12,600	
	136,000 lb. at 2s. 6d. profit ..	17,000	
		£29,600	= 28 per cent. (on £105,000)
1912 ..	Rubber (360,000 lb.) 2s. profit ..	£36,000	= 28½ per cent. (on £125,000)
1913 ..	Rubber (540,000 lb.) 1s. 6d. profit. ..	£40,500	= 32 per cent.
1914 ..	Rubber (740,000 lb.) 1s. 3d. profit. ..	£46,250	= 37 per cent.
1915 ..	Rubber (950,000 lb.) 1s. profit. ..	£47,500	= 38 per cent.
1916 ..	Rubber (1,175,000 lb.) 9d. profit. ..	£44,062	= 35 per cent.
1917 ..	Rubber (1,375,000 lb.) 6d. profit. ..	£34,375	= 27½ per cent.
1918 ..	Rubber (1,550,000 lb.) 4½d. profit. ..	£32,562	= 26 per cent.
1919 ..	Rubber (1,700,000 lb.) 3d. profit. ..	£21,250	= 17 per cent.
1920 ..	Rubber (1,800,000 lb.) 3d. profit. ..	£22,500	= 18 per cent.
			287 per cent.

If Selaba ultimately produces 1,900,000 lb. of rubber to sell at 1d. per lb. it will pay .. .. 6 per cent.

On the basis of these figures Highlands and Lowlands will pay roundly an average of 25 per cent. for the next ten years, or 15 per cent. for twenty years; Selaba will pay 28½ and 17¼ respectively. In other words, for a ten years 6 per cent. investment Highlands and Lowlands shares on the worst basis are worth just over £4, or for twenty years 5 per cent. investment £3; Selaba are worth £4 15s., or just under £3 10s. It must, however, be remembered that Highlands and Lowlands have opportunities for considerable planting extensions, and by 1920 may be turning out more than 4,000,000 lb. of rubber, whereas Selaba's opportunities for expansion are restricted. Highlands and Lowlands has the money from the Ayer Kuning sale to work with, so that in 1919-20 its dividend may be nearer 20 per cent. than 13 per cent., and subsequently 6 rather than 5 per cent. Highlands and Lowlands, it may therefore be said, are worth their present price, and in Selaba there is room for a considerable advance.

OVER-PRODUCTION OF RUBBER SHOWN TO BE IMPOSSIBLE.

The "Tropical Agriculturist," Ceylon, reprints from the "Manila Bulletin" of April 10, 1911, the following article on rubber production, which should be of the greatest interest to those who are hesitating to plant rubber in Queensland, owing to a doubt as to possible over-production and consequently very low prices. Every year the cost of collecting wild rubber is increasing, and already it costs more to produce than plantation rubber.

At the request of the "Manila Daily Bulletin," Mr. A. W. Prautch has furnished an answer to the oft-expressed query: "Will there be an over-production of rubber when the millions of rubber trees, already planted in the East, produce rubber?"

"The supreme question is also that, if rubber should drop to 75 cents United States currency (3s.) per lb., what would be the result? The answer is that there would be still 100 per cent. profit in plantation rubber, while wild rubber could not be profitably collected for that figure.

"In view of the innumerable uses to which rubber can be put, if cheaper, the world will readily absorb all that can be produced, both wild and plantation.

"Mr. Prautch gives credit to 'Gernier's Rubber News,' from which the following is extracted: 'The native rubber tree of South America, the Hevea Brasiliensis, yielding what is known is known as Parà rubber, has proved beyond all question to flourish exceedingly in certain parts of Southern Asia as a cultivated tree grown in plantations at from 100 to 150 trees to the acre, and to commence yielding rubber in its fourth year. Moreover, it has been positively shown that the product of such plantations can be placed on the market at an inclusive cost of from 1s. to 1s. 6d. per lb. Under favoured conditions the costs have been less, and there is little doubt that in course of time expenses will tend to decrease, but for the time being it will be well to take 1s. 6d. per lb. as the basis of general calculations. Rubber has always found a ready market, and during the early part of 1910 realised as much as 12s. per lb. The present price is round about 6s. per pound, which gives a net profit of 300 per cent. Of the world's total output of, roughly, 80,000 tons, only a small proportion has hitherto been supplied by the Eastern plantations, the total of 1910 being about 8,000 tons, or 10 per cent. The balance comes mainly from Brazil and Africa, and represents the output from wild or uncultivated sources. It will thus be seen that, inasmuch as from this time onward there will be a rapidly increasing output from the plantations, sooner or later—barring a corresponding augmentation of the consumptive demand—the two sources of supply must enter into competition.'

"In view of the overwhelming odds in favour of the plantations there is only one possible issue to such a struggle. In the first place, the costs of collection of wild rubber are double those of the cultivated article, and the arguments that necessity may bring about greater economy in the former case applies with equal force to the latter. In addition, labour and transport are obviously much more difficult problems in the collection of rubber over large and almost inaccessible areas than on a plantation where 100 mature trees occupy a space often only one-hundredth part as large as that taken up by a similar number of trees in their native habitat. This fact alone must always tell largely in favour of the plantations. The possibility of serious competition by substitutes or synthetic rubber is also rendered a negligible quantity, owing to the cheapness of plantation production. The main points, therefore, are: that anything over 1s. 6d. per lb. represents profit; that competition from outside sources is hardly worthy of consideration; that with a selling price of less than 3s. per lb. wild supplies will not pay to collect, though the plantations will make 100 per cent. profit. It seems assured that the future of rubber must lie with the plantation. So long as Brazil finds it profitable to collect rubber, the plantation companies will continue to pay remarkably handsome dividends, and when, owing to lower prices, wild supplies go out of the market, there is no room for reasonable doubt that, in view of the innumerable uses to which rubber can be put, the world will readily absorb all that can be produced."

Chemistry.

DAIRY SALTS (II.).

By J. C. BRÜNNICH and N. H. CHRISTENSEN.

Since the publication of the analyses of dairy salts in this journal (July, 1910), which raised the interest in the importance and advantages of the use of salt of the highest quality of purity in the butter factories, the quality of some of the salts has somewhat improved. Lym salt, however, comes easily first with regard to composition and fineness of grain, and is practically a chemically pure product.

For the purpose of the present series of analyses, samples were obtained not only from the vendors of salts, but our inspectors also collected samples of salt actually used in the butter factories; and it will be noticed, from the second table, that the composition of each variety shows only slight variation, principally due to variation in moisture contents.

"Higgin's Fine Salt" had again to be included in the list of salts used in butter factories, although the manufacturers themselves state:—"Higgin's fine curing salt, ... is prepared specially for curing meat, and is wholly unsuited for use in a dairy." The bags of this salt are clearly branded "Higgin's Fine Salt—Curing and Packing"; but, nevertheless, the salt was found to be used in three factories, and was actually invoiced as "Higgin's Dairy Salt."

The importance of the composition of a salt used in butter factories has already been explained in the previous publication, the presence of even comparatively small amounts of lime salts in aiding the development of bacteria is well known, whereas a pure sodium chloride is almost sterile.

It is necessary to point out that, for the same reason, the purity of a salt is of equal importance in the meat curing and preserving industry, and the users of cheaper inferior salts must lose in the quality of their products.

—	Waratah Extra Fine Salt.	Castle Extra Fine Dairy Salt.	Mermaid Dairy Salt.	Lym Pure Salt.	Higgins' Fine Salt—Curing and Packing.	Black Horse Dairy Salt.	Diamond Dairy Salt.
	%	%	%	%	%	%	%
Sodium chloride ...	97·78	97·75	98·45	99·79	97·29	97·09	98·10
Sodium sulphate ...	·16	·14	·01	·04	Nil	·83	·08
Calcium sulphate ...	·56	·66	·75	Trace	1·42	·83	·49
Magnesium chloride	·40	·30	·13	·07	·10	·07	·30
Insoluble matter ...	·03	·04	·16	Trace	·02	Trace	·03
Combined water ...	·52	·53	·20	·09	·51	1·12	·47
Moisture	·55	·58	·30	·01	·66	·06	·53
Total water ...	1·07	1·11	·50	·10	1·17	1·18	1 00

—		Moisture.	Combined Water.	Sodium Chloride.
		%	%	%
Castle Salt, 7 samples	from	·47	·11	97·18
	to	1·29	1·49	98·05
	average	·75	·39	97·51
Mermaid Salt, 6 samples	from	·30	·08	98·02
	to	·61	·75	98·45
	average	·38	·11	98·26
Lym Pure Salt, 6 samples	from	·01	·09	99·69
	to	·27	·14	99·83
	average	·07	·11	99·76
Higgins' Fine Salt, 3 samples	from	·42	·51	97·29
	to	·66	·71	97·86
	average	·52	·62	97·40
Waratah Extra Fine Salt, 3 samples ...	from	·55	·27	97·79
	to	·64	·52	98·53
	average	·60	·38	98·19

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1910.						1911.						
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.
North.													
Bowen	0·58	0·18	3·75	0·30	3·89	5·36	23·72	7·57	10·66	1·64	0·12	0·2	Nil
Cairns	Nil	3·59	1·34	1·67	7·27	11·59	34·49	27·43	35·35	52·31	2·08	1·44	1·48
Geraldton (Innisfail) ...	1·34	7·42	11·51	3·18	7·30	4·77	36·96	35·51	28·39	50·53	3·58	5·10	6·20
Gindie State Farm ...	1·45	Nil	...	...	..	3·87	11·69	4·15	2·29	0·29	0·29	Nil	Nil
Herberton	Nil	0·88	0·58	0·43	4·93	9·71	11·43	13·16	15·35	14·17	0·58	0·36	0·40
Hughenden	0·48	Nil	2·75	1·57	3·41	1·13	9·15	3·76	0·17	6·29	0·4	0·2	0·2
Kamerunga State Nurs.	...	3·39	...	2·06	...	..	...	23·08	...	52·28	151·0	...	...
Mackay	1·1	0·48	4·32	0·7	2·67	2·15	30·52	13·04	14·41	3·14	0·77	0·22	0·43
Mossman	...	1·91	2·90	3·17	10 36	19 91	32·76	21·95	71·64	37·10	1·44	0·33	1·28
Rockhampton	1·67	0·23	1·62	0·99	4·17	2·46	9·64	21·07	6·39	1·44	0·56	Nil	0·24
Townsville	0·33	0·3	3·34	0·11	2·53	6·77	25·40	19·24	4·24	3·02	0·7	0·11	Nil
South.													
Biggenden State Farm	0·92	0·28	...	2·36	4·59	5·96	10·37	7·34	6·25	...	...	...	...
Brisbane	0·39	...	2·72	3·27	2·49	13·99	10·30	5·84	4·69	0·88	0·90	0·9	1·70
Bundaberg	2·10	0·16	2·33	0·70	8·39	1·58	21·05	9·75	4·31	1·46	0·56	Nil	0·37
Crohamhurst	0·63	0·70	2·30	3·83	3·31	6·20	28·85	19·20	16·67	2·94	1·21	0·13	3·58
Dalby	1·42	0·64	2·11	3·96	4·09	3·29	8·08	2·24	3·20	0·76	0·91	Nil	0·68
Esk	0·58	0·23	4·65	3·41	3 84	7·53	11·90	6·04	3·54	0·99	1·90	Nil	...
Gatton Agric. College	1·99	0·60	...	3·60	2·85	6·84	12·03	3·98	2·80	1·38	0·58	Nil	0·72
Gympie	0·83	0·32	1·54	2·90	3·16	1·96	9·13	5·33	6·02	1·88	0·32	Nil	0·97
Ipswich	1·67	0·58	1·55	3·70	1·96	5·04	8·15	4·19	2·51	1·38	0·42	Nil	0·59
Maryborough	1·09	0·35	1·22	1·53	4·19	3·19	16·93	6·58	7·20	2·61	0·16	0·11	0·62
Roma	1·24	Ni	0·46	3·64	4·39	0·96	11·52	5·94	1·25	0·14	1·13	Nil	0·67
Roma State Farm ...	...	...	0·38	2·95	3·50	7·97	9·72	...	5·39	0·04	·02	...	...
Tewantin	0·76	1·34	1·52	3·17	7·71	8·25	20·84	8·50	18·11	1·78	0·57	0·22	2·53
Warren State Farm ...	...	...	...	0·45	...	...	...	11·75	3·17	...	...	Nil	0·6
Warwick ...	1·82	0·54	1·39	2·20	3·86	3·46	7·13	2·01	3·12	0·74	1·04	Nil	1·20
" Hermitage State Farm	1·73	0·39	...	...	...	...	...	...	...	...	...	...	...
Westbrook State Farm	...	...	...	2·98	...	4·44	5·26	3·90	1·76	5·50	0·79	0·1	1·1
Yandina	0·70	0·15	0·88	3·34	5·16	16·05	12·04	10·73	12·02	2·68	0·28	Nil	2·43

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

Vegetable Pathology.

SOME OBSERVATIONS ON THE NITROGEN-FIXING BACTERIA ASSOCIATED WITH LEGUMINOUS PLANTS.

By THOS. L. BANCROFT, M.B.

I have taken an interest in this subject from an early date.* I consider it wrong now to regard the bacterial nodules as disease.

Every species of the order *Leguminosæ* seems to be living in association with a specific bacterium; they (the plant and its bacterium) live in conjunction apparently as messmates for mutual benefit.

The leguminous bacteria can be differentiated, one from the other, by their appearance under the microscope and by their behaviour to straining reagents.

The particular bacterium connected with the common pea, for instance, will not live in association with lucerne, neither would the several kinds on our wattles live on the Moreton Bay chestnut; each plant has its own bacterium, and no other bacteria benefit that particular plant.

These leguminous bacteria are almost certainly unable to live an independent life in the soil apart from their associated plants. There is an erroneous idea prevalent, however, that they do live independently; that failure in growing any legume in a healthy condition is regarded as due to the absence of nitrogen-fixing bacteria in the soil. The Americans, at one time—I do not know whether the practice exists still—recommended a farmer about to plant to communicate with the Department of Agriculture, stating the kind of crop he purposed growing, and the department would supply a small packet of earth containing the particular bacterium that would benefit that crop; the contents of the packet was to be mixed with a large quantity of earth, and this distributed over the ground preparatory to sowing. Well, that procedure may possibly benefit some plants, but it is absolutely useless and unnecessary for a leguminous crop.

There are many different saprophytic bacteria of the soil which are capable of fixing nitrogen from the air present in the soil in building up their own tissues; such bacteria when dead and decayed would serve as nitrogenous manure; the *Leguminosæ*, however, cannot benefit from nitrogenous manure, and do not require it, as the bacteria living in association with them supply all the nitrogen required. I once made the attempt to grow lucerne free from the bacterial nodules on the roots, and found it impossible, for as soon as the plant is rid or nearly rid of its bacteria, its constitution is so weakened that it sickens and eventually dies. I proceeded in this way: Having procured a bag of scrub soil from a locality miles away from any cultivation, and which soil could never possibly have been contaminated with lucerne, I filled some new flowerpots with it and planted lucerne seed. It grew well, and the roots were covered with nodules containing bacteria; it made no difference whether the soil was heated to redness previous to sowing or the young plants only watered with water that had been boiled; nodules were formed just

* On Bacterial Diseases of the Roots of the Leguminosæ—Proc. Linn. Soc., N.S.W., VIII. (2nd ser.), 51. (1893).

the same. I tried trimming off the nodules and small roots, scrubbing well what root was left; if the plant grew at all after this treatment nodules formed again.

The seeds contain the particular bacterium associated with the plant.

You might plant a dozen different leguminous seeds in the same pot and each will produce nodules on its roots containing its own special bacterium.

Failure to grow a leguminous crop is certainly not due to the absence of nitrogen-fixing bacteria, but to other causes, such as unsuitable climate, deficiency of lime, potash, phosphorus, &c.

The leguminous bacteria permeate the whole plant; cuttings of lucerne struck in sand and transferred to sterilised soil produce nodules on their roots. By taking off the new growth of a rooted cutting of lucerne and striking it in sand, and repeating this procedure from the second cutting, you can get a piece of lucerne free from bacteria, but it will not grow; that was my experience, but I hope shortly to make further experiment in this direction.

HADLEY'S CANE HARVESTER.

Mr. A. N. Hadley, of Indianapolis, who has been experimenting with his invention of a cane-harvesting machine, has recently returned from Cuba (says the "Louisiana Planter") and reports that he has made a complete success there. He states that his machine will now strip and gather and has been stripping and gathering up from the ground all kinds of tangled and matted canes. His machine has handled canes that were so knotted and crooked that one would think they were beyond control by any machine. His success has been such that he announces now that he will be ready to lease his perfected machine to those desiring to use it in the coming season. More information concerning the same will be given later on.

Mr. Hadley certainly deserves great admiration and unqualified support in the exploitation of his invention. His natural inventive ability, which has already been utilised in other directions to a very considerable extent, has availed him much in his efforts to perfect a sugar-cane harvester, and his untiring energy and unswerving persistency, notwithstanding various disappointments and drawbacks, have been shown throughout the several years in which he has been engaged in this work. We sincerely hope that his most sanguine expectations will now be realised, and that the cane-cutting problem will have met its solution at his hands.

Animal Pathology.

CONTAGIOUS PLEURO-PNEUMONIA IN CATTLE.

The Department of Agriculture and Stock, Brisbane, has issued the following instructions for the eradication of the above disease for the information and guidance of stockowners in this State:—

This disease is spread by healthy cattle coming into actual contact with animals affected with the disease.

METHODS OF ERADICATION.

1. Owners of animals badly affected with this disease should be recommended to slaughter them immediately.

2. It must be remembered that animals that have recovered from even a slight attack of pleuro-pneumonia are capable of spreading the disease probably for some years after apparent recovery.

3. If the affected animals are not slaughtered they should at any rate, if possible, be kept apart from the healthy ones.

4. The healthy cattle should then be inoculated without delay with virus obtained from a sick beast.

5. In choosing an animal to slaughter for virus it is advisable to select one whose breathing is very rapid and painful.

6. To obtain virus, an animal as above is killed and bled by cutting its throat rather high up the throat, as the usual way of sticking gives an exit to the virus. The beast is then placed on its back, skinned, and its abdomen opened in the middle line behind the brisket. Then, with a *clean* knife, the diaphragm is cut close up to the brisket until the operator obtains a view of each side of the chest cavity. Should a quantity of clear straw-coloured fluid be discovered in the chest cavity between the ribs and lungs, this fluid is the virus used for inoculation purposes, and it should be carefully ladled out with a pannikin, and with the help of a funnel poured into bottles. The person obtaining the virus should first thoroughly wash his hands with soap and water containing Little's or Quibbel's Fluid Sheep Dip, in the proportion of one teaspoonful to a pint of water. The knife used to open the skirt or diaphragm, the pannikin, the funnel, the bottles and their corks, used in connection with virus, should, before use, be immersed in a saucepan or copper of cold water, and the water boiled for 10 to 15 minutes. These articles after coming out of the pot should only be handled by the operator, except the outside of the bottles, which may be handled by an assistant. If the virus has to be kept for more than a few days it should have added to it glycerine in the proportion of one part of glycerine to four of virus. Virus should be stored in a cool place—preferably in an ice-chest.

If the liquid in the chest cavity be reddish in colour due to admixture of blood, it will, if used while fresh, be suitable for inoculation purposes.

Should there be no fluid in the chest cavity, the brisket should then be sawn through and the lungs removed whole. They are then washed with rain water, to remove all traces of blood, and placed on a large dish or tray which has previously been cleaned with boiling water, or, better still, has been boiled in a copper for ten minutes.

After remaining there for half an hour the lung should be sliced up with a clean knife, and the slices squeezed in order to force out the liquid contained in them. The pinkish portions close to the more hardened and darker of the affected portions of the lungs usually contain a large amount of virus, and these are usually sliced in preference to the darker portions. The material that gravitates to the tray or dish is virus, and should be stored as above described.

The seat of operation is the upper surface of the tail, about 3 in. from the tip, though some people operate just above the brush. The operation can be performed either by the Seton method or by the inoculation syringe.

Whichever method is adopted, the hair for a few inches around the seat of operation is clipped off with a pair of scissors, and the skin washed with a 2½ per cent. solution of fluid sheep-dip. This part of the work should, if possible, be done by an assistant.

METHODS OF OPERATING.

With the Seton Method.—The two-edged knife is first passed through the skin on the upper surface of the tail from side to side. The seton needle is then passed through the opening thus made, a seton previously soaked in virus is then passed through the eyelet and the needle withdrawn, carrying one end of the seton through the wound; the two ends of the seton are then tied together. The wool used for setons should first be boiled for ten minutes and then spread out on clean newspaper or some clean substance to dry in the sun. When required, it is cut into strips about 4 in. long, and a number of these are placed into a wide-mouthed bottle of virus to be used as required. The seton needle, two-edged knife, and the bottle in which the virus is placed should be boiled for ten minutes before being used.

With the Syringe.—This is the cleanest and most reliable method. The syringe is boiled for ten minutes before use, a few drops of sterile olive oil are then sucked into a syringe to lubricate the piston; the oil is then ejected, and the syringe is ready for use.

A small nick is made with a knife in the skin on the upper surface of the tail. The syringe is then charged with virus, and the needle of it inserted into the opening in the skin, passed downwards under the skin for about 1 in., moved a little from side to side, so as to form a little pocket, and the contents injected. On withdrawal of the syringe a little ointment, made of Stockholm tar 1 part and lard 4 parts, should be smeared over the skin wound.

Care should always be taken to handle the tails very gently, as many failures are partially due to the rough way in which these are handled.

The immunity conferred by inoculation does not as a rule last longer than twelve months; hence the necessity of repeating the operation yearly if recovered animals are retained in the herd.

The milk from cows actually affected with pleuro-pneumonia should not be used for human consumption, but the milk from the healthy in-contacts can be so used.

After taking virus from a beast, the lungs and lymphatic glands should be thoroughly examined for any indication of tuberculosis, and if any lesions of this disease are discovered, the virus should be destroyed.

Science.

STEAM AND GAS, AND THEIR APPLICATION FOR POWER PRODUCTION.

[A paper read by the Engineering Instructor, Mr. J. Lyle, Queensland Agricultural College, to the State School Teachers attending the Winter Course of Instruction at the Queensland Agricultural College, Gatton, 7th July, 1911.]

Little more than half a century ago, the agriculturist had the choice of comparatively few mechanical appliances by means of which to reduce the manual labour and expense necessary for carrying on his business.

Now, however, it is recognised that mechanism, and especially motor mechanism, is one of the most potent factors for the successful development of modern farming.

The farmer himself, although not necessarily a skilled mechanic, would now find it to be much to his advantage if he acquired at least an elementary understanding of physics, as applicable to the production and transmission of power, and also a knowledge of the "Mechanics of Fluids": Hydrostatics—Pneumatics—Hydrokinetics.

The primary object of these studies, and in especial a study of the use of steam or gas for motor purposes, is to learn the conditions which tend to economic efficiency so as to obtain from steam or gas power plants the greatest possible amount of work in return for the lowest consumption of fuel, whether *solid, liquid,* or *gaseous.*

There is a fascination for nearly all of us to watch "power in motion," and the query as to how the motion is produced is common to all intelligent observers.

From College students and from teachers during Winter courses there are, as might be expected, many queries put to the engineer about steam boilers, engines, pumps, &c., and this paper, with lantern views to-night, is intended to answer, both theoretically and graphically, the general trend of those queries, by reference to developments in the use of steam and internal combustion engines for power production.

If first, then, an understanding of the principles which underlie the production of mechanical power be conveyed to the student, he will more readily follow the conditions necessary for successful practical application of steam or gas.

Motion of all kinds, being only an *effect,* let us apply some of our lessons in physics to realise a *cause.*

I venture to submit "That all motion is due to, and caused by, natural or artificial disturbance of equilibrium." For example:—

First: How are wind engines moved to do useful work? By the impact of air in motion, which is called wind, and the cause of wind is a natural and beneficent disturbance of equilibrium through unequal temperature and pressure in the atmosphere, the air moving in by the law of gravity from regions of high pressure to regions of low pressure, this motion making it possible to pump water and do other useful work by means of wind engines, which, by partially intercepting the flow of the wind, converts the kinetic energy due to its velocity into motive power.

Second: How are water-wheels and turbines forced to revolve and give out useful work to the extent of thousands of horse-power? By partially intercepting the flow of water in motion, and the cause of the

water being in motion is natural and beneficent alteration of temperature and pressure, and consequent disturbance of equilibrium, as between a supporting atmosphere and vapour clouds in suspension; hence rain, which on the higher parts of the earth's surface from rivers of water which rush by the law of gravity from higher to lower levels, in their course to the sea from which the water was originally drawn by evaporation, thus completing a cycle of changes involving motion, from which, by means of water-wheels and turbines, kinetic energy is converted into useful work.

Third: How are steam, hot-air, and internal combustion engines made to give out useful work? By *heat;* the concentration, application, conservation and dissipation of which involves most important and complex study for the student of "Engineering." Heat is concentrated and made applicable to motive mechanism by artificial *disturbance of equilibrium* as between the temperature and pressure of the atmosphere and any of the various mediums of communication to the movable parts—*i.e.,* the piston of a reciprocating or the blades of a turbine engine, either of which, by intercepting the flow of expanding heat molecules from a higher temperature and pressure to a lower temperature and pressure—or, in other words, from an artificially unbalanced temperature and pressure to the normal temperature and pressure of the surrounding atmosphere—converts part of the kinetic energy from the heat molecules to useful work.

The analogy between these three examples, I think, fully warrants the proposition "That all motion is due to, and caused by, natural or artificial disturbance of equilibrium," and that, to obtain power for useful work, it is only necessary for the engineer to modify mechanism, to utilise the potentiality of *wind, water, steam, gas,* and we might add *electricity,* as each, by natural or artificially created conditions, passes through a similar cycle of changes, for restoring natural equilibrium of temperature and pressure, in free atmospheric surroundings.

The first two examples, by naturally conforming to physical laws, with which nearly all here are conversant, are much simpler for the student to follow than the third, which involves artificial and mechanical operations, not quite so easily understood; but as we proceed I trust the analogy between the natural and the artificially created cyclical conditions for producing power in motion will be made clear. And here let me say that the student of engineering must be ever on the alert for developments of new practices and adaptations for power production, even although he wisely recognises that the first principles of the science remain the same, that every experiment fails which goes against the unchanging laws of creation, and that success comes only with the effort to make useful to mankind the hidden forces of Nature, by giving effect to those laws.

The subject is naturally divided into several specific heads—*i.e.,* "The Atmosphere," "Heat," "Water," "Steam," "Steam Boilers," and "Gas Generators and Engines"; but in the time at our disposal we can only deal very shortly with the part each is made to perform in power production.

The *atmosphere,* or air, is a mechanical combination of several gases, principally nitrogen and oxygen, with traces of carbonic acid and organic matter.

The qualities of the atmosphere which have direct interest for the engineer, and which have to be taken into account in nearly all calculations applying to steam boilers, engine cylinders, condensers, pumps, &c., are its *weight,* its compressibility, its expansibility and diffusibility, and

in connection with combustion in furnaces, or engine cylinders, its volumetric composition has to be considered relatively to the nature of the fuel to be used.

In designing steam boilers, to obtain specific evaporative efficiency, the requisite air supplies must be predetermined, so as to give practical application to known laws of combustion, which involve calculations bearing on "Fuel," "Fire-grate Areas," "Calorific Power," and kindred details.

And in the design of internal combustion cylinders, it is most important that the admission of air be correctly proportioned to suit the nature of the gas fuel available, so as to ensure the formation of an explosive mixture from which to secure a maximum development of thermal energy in return for any given volume of gaseous fuel used.

(TO BE CONTINUED.)

THE EUCALYPTUS AS A PREVENTIVE AGAINST MALARIA.

The "Tropical Agriculturist," Ceylon, publishes the following correspondence, addressed to "The Pioneer," on the subject of the prevention of malaria due to Anophele mosquitoes, by the planting of the Tasmanian Blue Gum. The writers appear to assume first of all that the gum tree of Australia is the Blue gum, ignoring the fact that the Eucalypti of this island continent are of various species; in fact—as the Government Botanist of Queensland, Mr. F. M. Bailey, C.M.G., says—their name is legion. It is quite correctly stated by "P.H." in his letter to "The Pioneer" that there are vast tracts in Australia in which the blue gum tree does not exist, which are free from malaria, and it might have been added that in the tropical North, where there are dense scrubs, plenty of water, muggy heat, and millions of mosquitoes, there is no malaria. This being so, how can the anophele mosquito carry infection? The writer has been driven from work in the scrubs in South Queensland by swarms of mosquitoes, but men, women, and children know nothing of malaria in these localities. The impression that the Eucalypti, owing to their balsamic exhalations, destroy mosquitoes is a false one. The part the tree plays in the economy of Nature is the absorption of maleficent gases in the soil, as shown in "Sperator's" letter. When the railway line was being built between Dalby and Roma many years ago, the men employed in clearing the brigalow scrubs on the line, and breaking up the soil which was full of large "Melon holes" containing stagnant water, suffered from malaria as soon as the soil was disturbed. In these scrubs there are no gum trees. Once the work was completed and the light and air were let in to the adjacent scrub lands, there was no longer any malaria, and to-day farmers and their families dwelling along the line enjoy a remarkable immunity from sickness, although the ubiquitous mosquito is there as numerous as ever, whilst Dalby itself is a recognised sanatorium. Even in the dense tropical scrubs of Cairns, Cardwell, and Geraldton (Innisfail), in North Queensland, there is no malaria attributable to the anopheles.

The letters alluded to are interesting, and we therefore place them before our readers.

"P.H." writes:—

"With reference to a correspondent's remarks in your issue of the 26th March in connection with the cultivation of eucalyptus trees as an

anti-malarial measure in India, I am afriad that the present-day anti-malarial sanitarian, with a full knowledge of the history of the cultivation of the *Eucalyptus globulus* and *E. rostrata* in the countries in which it has been adopted as a preventive of malaria, has little confidence in the process.

"The cultivation of blue gum trees had, in former years, a high reputation as a preventive of malaria, and there are several instances where successful results were said to have been achieved. Such are those of the Trappist Monastery, Tre Fontana, near Rome; certain malarious areas in Algiers around Bona, Philippeville, and in Corsica. The statistics regarding the incidence of malaria from the very regions in which this cultivation was carried out indicate that the expectations as to its effects in reducing malaria to any marked extent, have not been realised.

"The planting of *Eucalyptus globulus* in the Tre Fontana was started when the dominating theory regarding malaria was that it arose from miasmata from the soil. One of the beneficial effects of the blue gum tree was supposed to be due to certain balsamic exhalations destroying these miasmata. I have personally seen certain species of Culicine mosquitoes in swarms around young blue gum trees up the Huon River, in Tasmania, when the whole air was pervaded with the smell of these trees and the attacks of the mosquitoes named amounted almost to a pestilence. With a view to drying the subsoil, certain trees have been planted on account of the great activity of the transpiratory function shown by growing vegetation and the consequent absorption of excessive moisture from the soil, the number of trees planted being in proportion to the needs and dimensions of the locality. The proved relationship between anopheline mosquitoes and malaria now points to the fact that any beneficial effects that arise from arboriculture are due to interference with the multiplication of mosquitoes. Any virtue the blue gum tree may possess is probably unassociated with its exhalations, or its effects on the subsoil water; its influence is more satisfactorily explained by the simultaneous levelling of the surface soil effected with the planting of trees, this doing away with the breeding places of mosquitoes in the area under cultivation. Well-regulated cultivation of the soil is always healthy, but the beneficial influences (as regards malaria) following the planting of trees have been extolled beyond their intrinsic merits.

There are vast tracts of Australia in which the blue gum tree does not exist and which are free from malaria, although the right kind of anopheline mosquitoes are met with in these tracts; so that the fortunate exemption of Australia cannot be attributed to the influence of blue gum trees. It is not possible in the present state of knowledge to completely explain the cause or causes of the immunity of a large part of the Australian continent to malaria.

"Trees in belts or clumps, or even heavy shrubbery, placed between malarious localities and human habitation have frequently been known to act as a protective agency against malaria. They are natural interceptors of mosquitoes from their breeding places. On the other hand it is well known that such trees and shrubbery between the breeding grounds of anophelines and human dwellings may act as places of rest and shelter for these mosquitoes *en route* to lay their eggs and back again to feed on man. I am unable to state to what extent the cultivation of blue gum trees in India would be an economic success on account of its oil and timber, but I entertain litle hope that it would in any way make any serious

impression on the malaria of this country. It is even doubtful if it would grow in the same luxuriance it does in certain parts of Australia (South Australia, Victoria, New South Wales) and in Tasmania. We know that it has become naturalised in the Nilgiris, but the little experience we have of its cultivation on the plains does not encourage the view that it would be a profitable industry.

"Whilst anti-malarial sanitarians in India are anxious to avail themselves of every known measure of proved value and practical applicability in the prevention of malaria, it is probable they would consider that any available funds for anti-malarial measures might be more profitably employed in other directions than in the cultivation of eucalyptus."

"Sperator" says:—

"With reference to Mr. Booth Tucker's letter in your issue of the 13th March, suggesting the planting of the eucalyptus tree as an anti-malarial measure, I can quote a striking instance of its efficacy. The Roman Campagna was formerly the richest and most populous countryside in the world; it is now almost a desert solely on account of malaria and the malaria-propagating mosquito. The monastery of Tre Fontana, 3 miles from Rome, used constantly to have to send for a fresh supply of Trappist monks from healthier monasteries, and it is said that no monk survived three years in the monastery. Eucalyptus trees were introduced and planted in avenues near the monastery, and now the monastery is quite healthy. Anyone who cares to visit the monastery can not only see the place where St. Paul suffered martyrdom, but can also obtain a glass of excellent eucalyptus liqueur from monks no longer facing imminent death. To experiment by forbidding all cultivation and gardening has not been successful, nor is it to be wondered at, considering the fact that some of the driest districts are the most subject to the acutest malaria. I would humbly suggest that the experiment should be made of planting all the avenues of a cantonment with eucalyptus. There are many kinds of the tree, some of which can be grown in India. They are not unsightly and yield excellent timber, and the cost would be little greater than that of ordinary avenue plantation. To judge by the parallel of Italy, a country whose malarial problem is closely similar to ours, I suggest that no better expedient (apart from quinine prophylaxis) can be found."

BRITISH NEW GUINEA DEVELOPMENT COMPANY.

The report for the period ended 31st December, 1910, states that development and administrative expenditure in Papua and Brisbane, including salaries and all expenses of management and upkeep of vessels, amounts to £27,883. Down to 31st December, 1910, in addition to about 450 acres planted, rather over 2,000 acres have been cleared, and the directors have since received advices that large areas are being planted with Parà rubber, cocoanuts, and sisal hemp. From the tobacco plantation about 5 tons have already been harvested. The profit shown on the sale of stores for the period to 31st December, 1910 (about six months' working), amounts to £1,209. Sufficient labour for the present requirements of all the company's properties has now been obtained.

Answers to Correspondents.

POST-HOLE DIGGER.

Ratha, Logan, "Barneyview."

In reply to a request from Mr. Brown through this journal for information regarding post-hole diggers, Mr. S. Davis, Ratha, Logan, writes:—"I have much pleasure in stating I have used a post-hole digger and found it to be fairly successful, though not so good as one might be led to suppose from reading the advertisements about them. The advantages they give over the bar and shovel are: Faster work, under favourable conditions; a small, neat hole; and less ramming. A bar must be kept handy to remove any obstructions in the shape of stones or roots that may be met with. The work of turning them is fairly heavy, and depends entirely on the state of the ground, it being sometimes so hard that it is impossible to bore it with them. They work best after plenty of rain. The digger I use is one of the plain disc variety, with an auger point, and, from my observations while using it, I can see where some slight alterations could be made in its construction by which it would be greatly improved. I have not seen or tried any other kind of digger than the one mentioned."

CHOU-MOLLIER.

P. H. YOUNG, ESQ., Tambourine Mountain—

1. The Chou-Mollier belongs to the Kale, or Broccoli family.

2. As a feed for dairy cows, it should be fed after milking. When mixed with green barley it forms a useful feed for milk production. The leaves are liked by most classes of stock.

3. The plant favours a rich, well-drained, sandy loam, or alluvial soil, and would thrive also in scrub soils. In the case of the former, if the soil is not naturally rich, better results may be looked for by giving a dressing of farmyard manure some months previous to planting.

March, April, and May are the most seasonable months in which to sow the seed, the cost of which is about 5s. to 6s. per lb.

Young plants should be raised in a seed-bed, and transplanted to their permanent positions in drills 3 ft. apart, with individual plants 2 ft. apart in the drills. The seed is obtainable from most seedsmen. Yates and Co. and Anderson and Co. usually stock it, or it may be obtained through T. H. Wood, seedsman, George street, Brisbane.

The plant withstands frost, and, as it occupies the ground for several months, successive amounts of fodder may be had by using the lower leaves as they mature.

[This is just what my experience was with the Jersey cabbage. Ed. "Q.A.J."].

It is subject to the attacks of the Aphis, like many similar plants, and for this reason, partly, should not be kept growing during the summer months. The recent trials at the Hermitage State Farm, on heavy black soil, proved that the plant did not possess any special features to merit a choice between it and thousand-headed kale.

EARLIEST MANDARIN.

GEEBUNG, Palmwoods—

Mandarins fruit in the following order:—Parker's Special; six weeks later, Satsuma; four weeks after Satsuma, Scarlet Emperor; followed by Beauty of Glen Retreat; latest, King of Siam.

The King of Siam is scarcely known in Queensland, but is said to be a very excellent variety of mandarin.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	AUGUST. Prices.
Apples (Eating), per case	7s. to 8s.
Apples (Cooking), per case	6s. to 6s. 6d.
Apricots, per case	...
Bananas (Cavendish), per dozen	3d. to 4d.
Bananas (Sugar), per dozen	2½d. to 3d.
Cape Gooseberries, per case	4s. 6d. to 7s. 6d.
Custard Apples, per quarter-case	3s. to 5s. 6d.
Citrons, per cwt.	11s.
Lemons, per case	3s. 6d. to 4s.
Mandarins	3s. to 6s. 6d.
Nectarines, per case	...
Oranges, per case	2s. to 3s.
Papaw Apples, per quarter-case	1s. to 1s. 6d.
Passion Fruit, per quarter-case	4s. to 6s. 6d.
Peaches, per case	...
Pears, per case	..
Peanuts, per lb.	3d. to 3¾d.
Persimmons, per quarter-case	.
Plums, per case	...
Pineapples (Ripley), per dozen	1s. 3d. to 2s. 6d.
Pineapples (Rough), per dozen	1s. 3d. to 2s. 6d.
Pineapples (Smooth), per dozen	2s. 6d. to 3s. 6d.
Strawberries, per tray	3s. to 4s.
Tomatoes, per quarter-case	2s. 6d. to 6s.
Strawberries, per doz. boxes	...

SOUTHERN FRUIT MARKET.

Article.	Prices.
Apples, choice, per case	9s. to 10s.
Apples (Cooking), per case	1s. 6d. to 4s. 6d.
Apricots, per gin case	...
Bananas (Queensland), per bunch	only quoted as "very cheap"
Bananas (Queensland), per case	7s. to 9s.
Bananas (N. Queensland), per bunch	...
Bananas (Fiji), G.M., per bunch	3s. 6d. to 8s.
Bananas (Fiji), G.M., per case	12s. 6d. to 13s.
Cocoanuts, per dozen	2s. 6d. to 2s. 9d.
Custard Apples, per tray	7s. to 10s.
Grapes, per half-case	...
Lemons, per gin case	3s. to 6s.
Mandarins (local Emperors), per case	5s. to 5s. 6d.
Mandarins (Queensland), per case	6s. to 9s.
Oranges (Queensland), per case	4s. to 5s.
Oranges (Queensland Navels), per case	9s. to 10s.
Oranges (Sevilles), per gin case	2s. 6d. to 3s.
Passion Fruit, per half-case	4s. to 5s. 6d.
Papaw Apples, per case	4s. to 5s.
Peaches, per half-case	.
Peanuts, per lb.	5½d.
Pears, per gin case	...
Persimmons, per half-case	...
Pineapples (Queensland), common, per case	4s. to 6s.
Pineapples (Queensland), Ripley's, per case	5s. 6d. to 7s.
Pineapples (Queensland), Queen's, per case	4s. 6d. to 8s.
Plums, per half-case	...
Pomegranates, per gin case	...
Tomatoes (Queensland), per bushel case	3s. 6d. to 5s.
Strawberries, per 3-quart tray	...

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR AUGUST.

Article.		AUGUST. Prices.
Bacon, Pineapple ...	lb.	7d. to 8½d.
Barley, Malting ...	bush.	...
Bran ...	ton	£5 7s. 6d.
Butter, Factory ...	lb.	11d.
Chaff, Mixed ...	ton	£3 to £5
Chaff, Oaten (Victorian) ...	„	£5 15s.
Chaff, Lucerne ...	„	£2 10s. to £6 10s.
Chaff, Wheaten ...	„	£2 10s. to £3
Cheese ...	lb.	6¼d. to 7½d.
Flour ...	ton	£9 5s.
Hay, Oaten (Victorian) ...	„	£7
Hay, Lucerne ...	„	£5 15s.
Honey ...	lb.	2d. to 2¾d.
Maize ...	bush.	2s. 8d. to 3s.
Millet (Broom) ...	ton	...
Oats ...	bush.	3s. 6d. to 3s. 8d.
Pollard ...	ton	£5 7s. 6d.
Potatoes ...	„	£3 to £10 8s.
Potatoes, Sweet ...	cwt.	2s. 6d.
Pumpkins ...	ton	£2 10s. to £3
Pumpkins, Cattle ...	„	£2 10s. to £3
Wheat, Milling ...	bush.	3s. 7d. to 4s.
Onions ...	ton	£5 10s.
Hams ...	lb.	11d.
Eggs ...	doz.	9d. to 1s. 2d.
Fowls ...	pair	3s. to 4s.
Geese ...	„	5s. 9d.
Ducks, English ...	„	3s. 6d. to 4s.
Ducks, Muscovy ...	„	4s. to 5s.
Turkeys (Hens) ...	„	5s. to 5s. 6d.
Turkeys (Gobblers) ...	„	8s. to 11s.

TOP PRICES, ENOGGERA YARDS, JULY, 1911.

Animal.	JULY. Prices.
Bullocks ...	£7 15s. to £9
„ (Single) ...	£10
Cows ...	£6 2s. 6d. to £6 17s. 6d.
Merino Wethers ...	22s.
Crossbred Wethers ...	28s. 3d.
Merino Ewes ...	18s. 3d.
Crossbred Ewes ...	27s.
Lambs ...	18s.
Pigs (Porkers) ...	28s.

PRICES OF FARM PRODUCE FOR JULY.

LONDON QUOTATIONS.

Article.	JULY. Price.
Cotton (Uplands), per lb.	7·94½d.
Cotton (Sea Island), per lb.	12d. to 17d.
Cotton Seed, per ton	£6 to £7 10s.
Rubber (Pará), per lb.	4s. 5d. to 5s.
Rubber (Ceylon, Smoked), per lb.	...
Copra (S.S.), per ton	£23 7s. 6d.
Copra (Ceylon), per ton	£25
Copra (Malabar), per ton	£26
Hemp (Manila), per ton	£21 15s. to £32
Hemp (Sisal), per ton	£23 10s.
Hemp (Indian Sisal), per ton	£12 to £19
Hemp (Mauritius), per ton	£22 to £28
Ramie Fibre (China Grass), per ton	£48 to £50
Soja Bean Oil, per cwt.	31s.
Soja Beans, per ton	£7 5s. to £7 10s.
Coffee (Costa Rica), per cwt.	67s. to 73s.
Coffee (Fair Greenish), per cwt.	64s. to 68s.
Coffee (Low Middling), per cwt.	69s. to 73s.
Coffee (Bold Fair), per cwt.	66s. to 68s.
Coffee (Peaberry), per cwt.	69s. to 85s.

Times of Sunrise and Sunset at Brisbane, 1911.

DATE.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·4	5·33	5·29	5·47	4·59	6·5	4·46	6·28
2	6·3	5·34	5·28	5·48	4 58	6 6	4·46	6·28
3	6·2	5·34	5 27	5·48	4·57	6·6	4·46	6·29
4	6 0	5 35	5·26	5·49	4·57	6·7	4 46	6·30
5	5·59	5 35	5·25	5·49	4 56	6·8	4·46	6 31
6	5·58	5·36	5·24	5·49	4·55	6 8	1·16	6·31
7	5·57	5 36	5·23	5·50	4·54	6·9	4·46	6·32
8	5·56	5 37	5·22	5·51	4 54	6·10	4·46	6 33
9	5·55	5 37	5·21	5·51	4 53	6·11	4·46	6·33
10	5·54	5·38	5·20	5·52	4 53	6·11	4·47	6·34
11	5 53	5 38	5·19	5·52	4·52	6·12	4·47	6·35
12	5·52	5 38	5·18	5·53	4 51	6·13	4·17	6·35
13	5·50	5 39	5·16	5·53	4 51	6·14	4·17	6 36
14	5·49	5·39	5·15	5·54	4·51	6·14	4·47	6 37
15	5·48	5·40	5·14	5 54	4 50	6·15	4·48	6·37
16	5·47	5·40	5·13	5 55	4·50	6·16	4·48	6·38
17	5·46	5·41	5·12	5·55	4·49	6 17	4·48	6 39
18	5·45	5 41	5 11	5·56	4·49	6·18	4·49	6 39
19	5 44	5 42	5·10	5·57	4 48	6·18	4 49	6·40
20	5·42	5·42	5 9	5·57	4·48	6·19	4·50	6·40
21	5·41	5·42	5 8	5.58	4·48	6·20	4·50	6·41
22	5·40	5·43	5 7	5·58	4·47	6·21	4·51	6·41
23	5·39	5·43	5·6	5·59	4·47	6·22	4·51	6·42
24	5·38	5·44	5·6	6·0	4·47	6·22	4·52	6·42
25	5·36	5·44	5·5	6·0	4·47	6·23	4·52	6·43
26	5·35	5·45	5·4	6·1	4·46	6·24	4·53	6·43
27	5·34	5·45	5·3	6 2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6 25	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6 26	4·54	6·44
30	5·31	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	5·0	6·4	...	...	4·56	6·45

PHASES OF THE MOON.

			H. M.
1 Sept.	☾	First Quarter	2 21 a.m.
9 ,,	○	Full Moon	1 57 ,,
16 ,,	☽	Last Quarter	3 51 ,,
22 ,,	●	New Moon	0 37 ,,
30 ,,	☾	First Quarter	9 8 p.m.
8 Oct.	○	Full Moon	2 11 p.m.
15 ,,	☽	Last Quarter	9 46 a.m.
22 ,,	●	New Moon	2 9 p.m.
30 ,,	☾	First Quarter	4 41 ,,
7 Nov.	○	Full Moon	1 48 a.m.
13 ,,	☽	Last Quarter	5 19 p.m.
21 ,,	●	New Moon	6 49 a.m.
29 ,,	☾	First Quarter	11 42 ,,
6 Dec.	○	Full Moon	0 52 p.m.
13 ,,	☽	Last Quarter	3 46 a.m.
21 ,,	●	New Moon	1 40 ,,
29 ,,	☾	First Quarter	4 47 ,,

Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, prairie grass, panicum, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred. The planting of the sisal agave and the fourcroya may be proceeded with at any time of the year, but the best time is in spring and beginning of summer, when warm weather and good showers will enable the young plants to root quickly and become firmly established before the winter. The demand for the fibre is constantly increasing, and the supply does not nearly overtake the demand; hence prices keep high, and the outlook for the future is very promising. See our instructions in "The Sisal Industry in Queensland," obtainable free by intending planters on application to the Under Secretary, Department of Agriculture and Stock. Plant only on dry or well-drained soil. Cotton may still be sown.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of all kinds of vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Give plenty of water and mulch tomato plants planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant chrysanthemums, gladiolus and other bulbs, such as tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

Orchard Notes for October.

THE SOUTHERN COAST DISTRICTS.

As October is often a dry month throughout the greater part of the State, one of the most important duties of the fruit-grower is to keep his orchard or vineyard in a thorough state of cultivation, thus retaining the moisture in the soil that is essential to the setting and development of the fruit crop. As long as the land is level one cannot over-cultivate, as there is no danger of the soil washing, but when the orchard is on a hillside heavy thunderstorms, which may occur during the month, are very apt to cause heavy washaways of soil if the land is kept in the high state of tilth necessary to retain moisture. In this case the cultivation should always be across and not up and down the face of the hill, and where the soil is of such a nature that it will wash badly thin blocks, consisting of a row or two of a growing crop or of light timber, brushwood, or even a body of weeds or heavy mulching, should be provided, such blocks to follow the contour of the orchard. If dry, and water for irrigation is available, citrus trees will be the better for a thorough watering during the month. Give the trees a good soaking, and follow the irrigation by systematic cultivation, as this is much better than constant surface watering, as practised by the Chinese. Examine the orchard and vineyard carefully for pests of all kinds. When young trees are showing signs of scale insects, cyanide same; when leaf-eating insects of any kind are present, spray the plants that are being attacked with arsenate of lead. Look out carefully for black spot and oidium in grape vines, using Bordeaux mixture for the former and sulphur for the latter. When using sulphur, see that you get a fine sample—viz., one in which the particles of sulphur are in a very fine state, as the finer the sulphur the better the results. Do not apply the sulphur in the early morning, but during the heat of the day, as it is the sulphur fumes, not the sulphur, which do the good. A knapsack sulphurer is the best machine for applying sulphur to grape vines, trees, or plants.

Examine any late citrus fruits or early summer fruits for fruit-fly, and take every precaution to keep this great pest in check now, as, if fought systematically now, it will not do anything like the same amount of damage later on as if neglected and allowed to increase unchecked. October is a good month for planting pineapples and bananas. Be sure and have the land properly prepared prior to planting, especially in the case of pineapples, as the deeper the land is worked and the better the state of tilth to which the surface soil is reduced the better the results, as I am satisfied that few crops will pay better for the extra work involved than pines.

TROPICAL COAST DISTRICTS.

As the fruit-fly usually becomes more numerous at this time of year, especial care must be taken to examine the fruit thoroughly prior to shipment, and to cull out all fruit that has been attacked by the fly. Banana and pineapple plants may be set out, and the orchards should be kept well tilled, so as to have the land clean and in good order before the heavy summer growth takes place.

All the spring crops of citrus fruits should be now marketed, and the trees, where necessary, should be pruned and sprayed, and the land be well ploughed. The ploughing should be followed by harrowing and cultivating, so as to get the surface of the land in good order. Granadillas and papaws should be shipped to the Southern markets, as, if care is taken in packing and they are sent in the cool chamber, they will carry in good order. These fruits should not be gathered in an immature condition, as, if so, they will never ripen up properly. They should be fully developed but not soft, and if gathered in this condition, carefully handled, and packed and shipped in cool storage, they will reach the Southern markets in good condition, and, once they become commonly known, will meet with a ready sale.

Southern and Central Tablelands.

In the Stanthorpe district the spraying of apple, pear, and quince trees for codling moth will have to be carefully carried out, the best spray being arsenate of lead, of which there are several reliable brands on the market.

When fungus diseases, such as powdery mildew, &c., are also present, Bordeaux mixture should be combined with the arsenical spray.

The vineyard will require considerable attention, as the vines must be carefully disbudded, and any signs of oidium or black spot should be checked at once. Look out for late spring frosts, and, if possible, try the effect of smudge fires producing dense smoke for preventing any damage.

Keep the orchards and vineyards well cultivated, as it is of the utmost importance to keep the moisture in the soil at this time of the year if a good fruit crop is to be secured.

In the warmer districts cultivation is all-important, and when irrigation is available it should be used for both fruit trees and vines, a thorough soaking followed by systematic cultivation being given.

Stock-breeding in Queensland.

By P. R. GORDON.

HORSES.

Queensland, from the superior quality of its grasses, and the elastic nature of its atmosphere, is an ideal country for the breeding of horses. The coast watershed, with its strong seeding grasses—such as the Anthistirias, Andropogons, Panicums, &c.—is eminently suited for the raising of heavy draught stock; while west of the coast dividing range, and where the saline nature of the soil is indicated by its flora—such as the many forms of the Acacia family, its salt bushes (Rhagodia), its Mitchell grasses (Astrebla), and many other forms of herbage peculiar to soil impregnated with salts—is not only most favourable for the growth of bone, but the mere fact in itself of the stock having to travel over large areas while grazing renders the great Western pastures most valuable for the breeding of saddle and light harness horses required for faster work. The horse stock of Queensland comprises heavy and medium draught, light harness and saddle. The heavy draught breeds are Clydesdales and Suffolks; the medium draughts are a cross between either the Clydesdale or Suffolk with the light harness breed, which form a large proportion of the horses of the State. The saddle horses form, by far, the larger proportion of the horse stock of the State. This class had been allowed to greatly deteriorate until within the past ten years on account of the low prices obtainable for them; but during the past decade a great improvement has been effected in them, the prices now readily obtainable inducing breeders to invest in good purebred sires and to weed out inferior mares. In a great many breeding studs thoroughbred or Arab sires are now in use; and the constant demand for Australian horses in India has induced many to breed a type of medium active draught horse, termed by the buyers and exporters " gunners," the type most in favour being a cross between a Suffolk sire and the lighter mares in the State. For light harness purposes, the best are being bred in yearly increasing numbers, and are the get of either the Cleveland, the Hackney, or the Roadster, or the heavier class of saddle or light harness mares. The experience of the late South African war resulted in many turning their attention to a class of horse until then not generally bred in Queensland—namely, ponies of from 13 to 14½ hands high, the most suitable for mounted infantry; and pony-breeding has now been taken up by many, and of late years a number of pony sires have been imported from England, the Welsh type being in most favour. Horses bred for purposes of mere pastime—such as the racehorse, American trotter, or the polo pony—form but a comparatively small proportion of the total horse stock of the State.

CATTLE.

In Queensland, as in other countries, the cattle form two distinct divisions—beef breeds and dairy breeds. Of the beef breeds by far the larger proportion consist of Durhams or Shorthorns, the Hereford breed coming next in importance; the Devon and Aberdeen-Angus black polled breed being used almost solely for crossing purposes. As already stated, the Shorthorns largely predominate, and there are a number of large stud herds of the breed which annually produce for sale pure herd bulls of the breed, and thus the general, or bush herds, are being gradually graded up. The Hereford breed is preferred by many breeders, particularly on the coast watershed or on the higher and rougher pastures, as it is considered by many that they are more hardy than the Shorthorns. There are in the State some high-class stud herds of this breed in which first-class herd bulls are bred; and many old established Shorthorn herds by many years' use of purebred Hereford bulls, have been graded up to the pure Hereford type. The Devon breed, as already stated, is principally used for crossing on Shorthorns, which produces a compact fleshy carcass greatly in favour with exporters of frozen beef. These are mostly bred in the Northern latitudes. The Aberdeen-Angus, which in Great Britain and America are considered to produce the choicest of beef, have not captured the fancy of Australian cattle-breeders to any great extent, the black colour being literally the *bête noir* of most Australian breeders. Where adopted, however, they have been found to thrive exceedingly well in Queensland and to produce the choicest of meat. The establishment of the dairy industry in Queensland is of such recent occurrence that it seems almost marvellous how, in so few years, such a number of district dairy breeds could have been got together. There are many still not past middle age who can remember that the first appearance of an Ayrshire cow at one of the Queensland National Association shows was hailed with derision and pronounced a "scrubber," and yet at the last show of the association 361 purebred dairy cows and bulls were exhibited, representing eight different and distinct breeds. Assuming that these represented proportionately the number of the respective breeds in the State, the relative percentages of each breed would come out as follow:—

	Per cent.
Ayrshires	38
Jerseys	24
Milking Shorthorns	18
Illawarras	13
Holsteins	5
Guernseys	0.9
Red Lincolns	0.9
Dexter Kerrys	0.2

Fortunately, these breeds have been laid on a good foundation. This is particularly the case with the Ayrshires and Jerseys, and it has been generally remarked by visitors to our National Shows from other States that the display of Jerseys at them are superior in numbers and quality to that at any of the other capitals in Australia. What are known as the Illawarra breed is a milking breed evolved in the south coast of New South Wales, and is a composite breed, the Shorthorn type largely predominating; the breed being developed purely on practical lines, all cows not coming up to a certain standard of milk production being ineligible for registration in the Herd Book. The milking Shorthorn is deemed the best dual-purpose cow, and is being gradually developed on most of the principal dairy farms.

SHEEP.

The Merino is by far the most numerous of the sheep stock of the State; but, with the development of the mutton and lamb frozen export trade, the crossbreeding with the Merino and various English mutton varieties has been adopted wherever the quality of the pasture and the nearness to railway facilities will permit. The Merinos are classed as fine, medium, and strong woolled. The fine are principally confined to the western slopes of the great coast range, the medium to the intermediate districts, and the strong is produced in the Northern latitudes and on the great Western plains. The English breeds in use for crossing purposes are the Lincoln (most largely in use), the English Leicesters, the Border Leicesters, the Romney Marsh, the Shropshire Downs, and a few South Downs. The Romney Marsh, which has the reputation of being a fluke-resisting sheep, is mainly confined to coastal districts. The Shropshire is deemed by many as the best breed for the production of lamb freezes; but opinion is by no means unanimous on that subject, and by many of the more extensive sheepbreeders the Lincoln is preferred on account of the length and lustre of its wool staple.

On the discovery of the Flinders country, the wool experts in London declared that wool could not be successfully grown in the Northern latitudes of Queensland, and that it would ultimately turn to hair. Later still, the wool men in Sydney and Melbourne declared that, in order to produce a good marketable wool in Northern and Western Queensland, wool-growers there would have to have recourse to constant infusions of fresh blood from Southern flocks, forgetful of the fact that each district stamped its own type on wool, and that this constant infusion of fresh blood from Southern latitudes was but a disturbance of the process of acclimatisation.

It is now well known that the medium combing wools of North-Western Queensland are most eagerly competed for by European and American manufacturers, and have frequently topped the market at the Australian wool sales.

Agriculture.

FARM BOOKKEEPING.

No set of books or system of bookkeeping can be recommended as the best for farmers under all circumstances. Much depends upon the size of the holding, the class of business carried on—whether there is any retail trade in such things as milk or other dairy produce or poultry, and, lastly, upon the capabilities of the farmer himself and the amount of time and labour he is willing to devote to accounts.

A SIMPLE SYSTEM.

One of the principal points which has retarded the general adoption of bookkeeping on small farms is the amount of clerical work involved. For such holdings, where the farmer usually works with his men, it is best to use a very simple system requiring few books or different places of entry. A short description of the books to be kept is given below:—

(1) *Diary.*—A diary is intended to contain daily notes of cultivations, manures applied, crops sown or harvested, quantities threshed, foods consumed, and any observation the farmer may think worthy of being recorded. Columns should be provided for daily receipts and payments, and also a form for labour account. The whole of the entries for the day, however varied in character they may be, are made in this book. The following is an example of the form, but the space allotted to each day's entries would, of course, be much greater:—

DIARY.

Date.			Received.	Paid.
	Brought forward			
	Saturday	[In this space, a record should be made of all farm work, purchases, sales, orders, &c.]		
	Sunday			
	Monday			
	Tuesday			
	Carried forward			

WEEKLY LABOUR ACCOUNT.

Name of Labourer.	S.	M.	T.	W.	Th.	F.	Total.	Rate of Wages.		
Carried forward										

(2) *Cash Analysis Book.*—This is a book to which receipts and payments are transferred from the diary and entered in columns to their

proper accounts. Any number of columns may be provided; one should be allowed to each class of stock, produce, or other items of which it is desired to keep a separate record, as in the example below. At the end of the year the totals of these columns will show the total receipts or payments made during the year in respect of each of these items—*i.e.*, the receipts for cattle, sheep, corn crops, &c., and the payments for food, rent, manure, labour, &c. Money due but not received for goods sold during the year should be added to the receipts table, and payments due but not paid should be added to the payments table, because they belong to the current year's account, and influence the profit and loss. Sums owing and payments due at the beginning of the year should be deducted from the receipts and payments tables respectively, as they belong to the previous year's account. This is shown in the following specimen pages. For convenience the totals should be made up monthly and transferred to a summary page:—

CASH ANALYSIS BOOK—RECEIPTS PAGE.

Date.	From whom Received and Particulars.	Cattle	Sheep.	Dairy.	Poultry.	Corn Crops.	Hay.	Sundries.	Value of Produce used by Household.
	Total at end of year								
	Add money owing but not received								
	Deduct money owing but not received at beginning of year								
	Total sales for the year								

CASH ANALYSIS BOOK—PAYMENTS PAGE.

Date.	To whom Paid and Particulars.	Cattle.	Sheep.	Seeds.	Foods.	Manures.	Rent, Rates, Taxes, &c.	Labour.	Sundries.	Household Expenses.
	Total at end of year									
	Add money owing but not paid									
	Deduct money owing but not paid at beginning of year									
	Total payments and expenses for year									

Profit and Loss Account.—The Profit and Loss Account is prepared at the end of the year, after a valuation of stock, as follows:—

PROFIT AND LOSS ACCOUNT.

To valuation of Live and dead stock, tillages and unexhausted improvements at beginning of the year ...		By sales and receipts from analysis book, viz.—	
To payments and expenses from analysis book, viz.—		Cattle	
Cattle		Sheep	
Sheep		Wool	
Seeds		Dairy	
Foods		Poultry	
Manures		Corn Crops	
Rent		Hay	
Rates, Taxes, &c. ...		Other Produce	
Labour		Sundries	
Sundries		By valuation of live and dead stock, tillages and unexhausted improvements at end of year	
		Farm Produce used by household	
To Balance—profit for the year			

Household expenses are not entered in the Profit and Loss Account, since they have no bearing on the profitableness of the business. The value of farm produce consumed on the holding should be entered in the receipts book in the same way as if it were actually sold.

The foregoing system of accounts has the advantage of being easily understood and little liable to errors. It does not show even the approximate profit or loss on the different branches of the business, but it presents in a concise form the materials from which, with a little study and trouble, a very close estimate of these may be made in the case of a small farm. It may be recommended to those farmers who have not previously kept accounts or who have a disinclination for books.—"Board of Agriculture and Fisheries."

SILAGE v. HAY, ROOT, AND OTHER CROPS.

When one comes to compare the cultivation of silage crops with that of roots, there are two essential points in favour of the former. One is, their smaller expense; and the other is, their practical certainty. The farmer who makes silage can make certain of a store of food for the winter or for a time of drought. We have frequently alluded to the certainty of occasional droughts; and at this moment farmers, who have not made provision in the way of silage for the inevitable period of scarcity of fodder, will probably be regretting their incredulity and want of foresight. What has to be considered is: "Is it better to run the risk of losing thirty or forty valuable cows, or to expend from £100 to £150 in erecting a silo?" The long drought of a few years ago surely supplied the answer. The man who depends entirely upon either his root or forage crops may find himself left in the lurch at a time when there is little chance of making other provision.

So long ago as 1885-6, when there was an exceptionally severe winter in Great Britain, interesting evidence of the value of silage was abundant. The Royal Agricultural Society instituted an inquiry into the effects and lessons of that winter, and 350 replies were received from prominent agriculturists throughout England and Wales. In the

schedule of questions was one referring to silage. Many of the correspondents replied that they had no experience on the subject, but the remarkable fact was established that, of all those who had used silage, everyone expressed a high opinion of its value. They all, with one consent, agreed that their stock could not have got through that winter, as they did, without it.

At a Dairy Conference then held, Sir John Lawes said that it was probable that, when both hay and silage are of the very best quality that can be made, if part of the grass is cut and placed in silo and another part is secured in a stack without rain, one might prove as good food as the other. But it must be borne in mind that while the production of good hay is a matter of uncertainty—from the elements of success being beyond the control of the farmer—good silage, by taking proper precautions, *can be made with a certainty.*

In our Queensland climate, with its uncertain and often unexpected rainfall, this consideration is no light one. In some seasons such as we are now experiencing in some parts of the State, the advantage in respect of independence of the weather is reduced to a minimum by drought; but, even if the haying be favourable, it is not always possible to secure aftermath crops. If it were only for providing the means of saving second or third cuts of lucerne or millets, ensilage would be a boon and a blessing to farmers.

There is ample evidence to prove that an acre of green fodder made into silage will keep a beast longer than either an acre of the same crop made into hay or an acre of root crops. Great loss of succulent nourishment takes place in drying the various grass crops into hay. About the same weight per acre can be grown of silage forage crops as of, say, turnips. In this way, a third of the acreage is saved, and the forage crop is the cheapest to grow. All experiments made in the old country (and these have been very exhaustive) have gone to corroborate the soundness of the opinion that grass made into silage will feed one-third more stock than when made into hay.

As a food for stock, silage has the great advantage that, when properly made, it more nearly resembles the actual fresh grass than any other form of fodder. The necessary carbo-hydrates and nitrogen are even larger in the silage than in the fresh grass, while the small amount of acid (the silage being of the "sweet" kind) is, no doubt, conducive to the digestibility of the food.

Assuming that the relative feeding qualities of grass and silage are as nearly equal as analysis has shown them to be, the economy of the latter is very evident as compared with hay.

We will say that an acre of grass will make 1½ ton of hay. If so, it will certainly make 5 tons of silage and probably more. If we take the figures at 1½ and 5 tons respectively, we find that, on a ration of 20 lb. per day of hay, an acre of grass will feed a beast for 168 days; on a ration of 50 lb. of silage per day, an acre of grass will feed a beast for 224 days. Thus, by making silage instead of hay, a food supply for 56 more days is obtained. Or, put it in another way: It will take 2 acres of hay to feed a beast for the same period that 1½ acre of silage will feed it. This is a substantial advantage which no practical farmer can afford to overlook, especially in these times of high wages and high prices for food, when the first object of the dairyman is to get the largest possible milk returns from his stock at the least possible cost. All this applies to any crop which is capable of being turned into silage. Mention has been made

of the certainty of silage. It is much more free from risk than either hay-making or rootgrowing. How often has the farmer lost an entire crop of lucerne in consequence of heavy and continuous rains setting in before he could save it as hay. With a silo at hand, there can be no loss owing to unseasonable rains. The man who has silage is never in danger of having to sell off part of his stock on a falling market (owing to many others being under the same necessity of getting rid of a part of their cattle in order to save the rest) because of some sudden failure of crops either from adverse seasons or otherwise. He does not put all his eggs in one basket, as the farmer does who depends entirely upon the regular growth and harvesting of some particular crop. It is this reliability of silage which should earnestly commend itself to the dairy farmer as his sheet-anchor in times of stress. In our semi-tropical and tropical districts, where periods of heavy rainfall and luxurious growth are often followed by seasons of burning heat, weeks of dry weather, and consequent scarcity of vegetation, the system of ensilage is manifestly of material benefit. The surplus fodder of the rainy season may be stored in succulent condition to supply food for stock in time of drought. In some of our Australian summers and winters, a good supply of ensilage would mean the salvation of whole herds of cattle and flocks of sheep. Yet thousands of acres of magnificent grasses on boundless treeless plains are allowed to remain untouched to be swept away by bush fires, when the stockowner finds himself obliged to rail his stock at great expense to relief country; while the dairy farmer and the closer-settlement men—well, their only resource is to sell their stock at a ruinous loss, and practically begin the world over again, all owing to unbelief in the silo and in recurring droughts.

From the Government Statistician's Annual Report for 1911, it appears that there are 16,076 farmers engaged in dairying in Queensland, and that during the past year the value of the milk supply to the producer was about £2,000,000. Yet out of these 16,000 dairy farmers only 97 make silage, and that only to the amount between them of 5,804 tons of silage—that is to say, that, in the face of a possible shortage of feed should the dry weather continue, they make something less than one day's feed for the dairy cattle in the State, which number 365,000. The "Brisbane Courier" of 22nd September instances the case of a farmer at Wingham, New South Wales, who had 120 tons of silage and had made preparations to save 600 tons this year. He estimated that 200 tons would tide 50 cows over six months, and that one load of silage went as far as three loads of hay, and was as succulent as (if not more so) than green feed. This exactly bears out what we have stated in a former part of this article. On this farmer's calculation our 97 silage-makers produced just enough to tide over 1,450 cows for six months.

TREATMENT FOR SEED WHEAT FOR SMUT OR BUNT.

IMPORTANT DISCOVERY.

The Department of Agriculture (says the "Agricultural Gazette" of New South Wales) has decided to recommend farmers to treat their seed wheat for smut (bunt) this year by steeping it in solutions of bluestone and lime. This decision was arrived at as one of the results of the Departmental Wheat Conference, held on 17th and 18th January, to consider several matters connected with wheat-growing and kindred subjects, and a *résumé* of the reasons which led to the decision was ordered to be published in the "Gazette" for the information of wheat-growers.

The "Tasmanian Mail" refers to the matter as follows:—

"When this important subject was reached, Mr. Sutton explained the circumstances which induced him to tentatively recommend the use of bluestone and salt last year, a recommendation which was subsequently withdrawn by notice. Some two years ago, when on a visit to the Mallee district of Victoria, Mr. Sutton found that a practice of farmers around Sea Lake was to use salt water from the lake with which to make the bluestone solution, and excellent results were reported. Mr. D. McAlpine, Vegetable Pathologist of the Victorian Department of Agriculture, had publicly stated that the salt had no appreciable effect as a fungicide; and, as the practice was exciting the interest of farmers of New South Wales, Mr. Sutton decided to make a field test at Cowra, to ascertain what foundation there was for this practice. As he was testing other fungicides at the same time, he decided to try the effect of a saturated solution of coarse salt and water, as well as of a 2 per cent. solution of bluestone to which was added sufficient salt to make a saturated solution.

"The influence of each of the several fungicides was examined from three points of view—in the destruction of smut spores on the seed grain; the effect upon the vitality of the grain; and the prevention of reinfection with smut. It was found that salt water had very little effect in the destruction of the bunt spores, confirming Mr. McAlpine's opinion, but Mr. Sutton was surprised to find that bluestone and salt destroyed a larger percentage of the bunt spores than any other fungicide tried; that its effect upon the germination of the grain was not at all serious; and that as a preventive of reinfection after treatment it held first place—though in the last-named section of the experiment a large percentage of the grain failed to germinate. In view of all the results, Mr. Sutton made the tentative recommendation that equal parts of bluestone and salt be used to make the pickling solution. This recommendation was followed last season by the officers of the experimental farms, by the Chief Inspector's staff in treating seed for the farmers' experimental plots, and by a large number of the farmers. The results were variable. In some places they were all that could be desired; in others the effect upon the germination of the treated seed was very serious. The causes of the variation are not definitely known, and the condition under which the treatment is injurious cannot be clearly laid down. The earliest opportunity was, therefore, taken to cancel the recommendation. But that there were ample grounds for the suggestion is clearly proved by the face that at Nowra Farm crops ranging from 30 to 36 bushels per acre have now been harvested from areas up to 10 acres each, sown with seed treated with bluestone and salt. One prominent Western Riverina farmer, moreover, states that he used no other treatment last year, and that he had the best crop he has ever grown.

"In recommending bluestone and lime those officers present at the conference have reverted to a fungicide which has consistently given good results in both the experimental plots and in the paddock. The principle of its action is very simple. The bluestone kills the smut spores upon the grain. Bluestone (sulphate of copper) is a well-known and well-tried fungicide, destructive to nearly all forms of fungus life. But if it is applied alone to smutty wheat it forms a coating around the grain, and when the seed begins to grow this coating of bluestone is very injurious to the young shoots and roots. It must, therefore, be removed before the seed is permitted to germinate. A very simple method of doing this has been suggested by Mr. Peacock. The seed may be allowed to stand for an hour or two after dipping in bluestone solution, so as to

ensure that all the smut spores are killed, and then dipped into cold water to wash off the bluestone. This has been found effective at both Bathurst and Cowra Farms; but a fatal objection to its use in dry districts is the fact that a large quantity of water is required. The water soon becomes saturated with bluestone, and has to be replaced, as its virtue in dissolving the coating of bluestone on the grain has gone. Water is not plentiful in the bulk of the wheat areas.

"A better method is to dip the bluestoned wheat into a solution of lime. The lime combines chemically with the bluestone and neutralises its destructive properties. The quantity of water necessary is, therefore, much less.

"Some scientific investigations recently made at the Woburn Experimental Farm, in England, by Pickering, resulted in the statement that milk of lime (lime suspended in water) is not so efficient nor economical to use with bluestone as lime water (lime dissolved in water). Lime water would be obtained by decanting the water from the lime as a perfectly clear fluid; milk of lime is made by simply slacking fresh lime in water. Pickering's discovery is being tested by the department in another connection. At present it cannot be recommended to farmers in treating wheat for smut, partly because it has not been sufficiently tested, and partly because a farmer could not always be quite sure that his lime is perfectly unslacked. If air or water has acted upon the lime since it has been burnt, it may be converted into carbonate of lime, when Pickering's method will give nothing but pure water. The department, therefore, recommends—for the present, at any rate—the use of freshly burnt lime mixed with water. This is commonly known as 'lime water,' but it is really a mixture of lime and water.

"The actual method of applying the bluestone and lime treatment is given below by Mr. Sutton:—

"The wheat-grower is troubled with two pests known as smut. They are bunt or 'stinking smut,' and loose or flying smut. When however, the farmer talks about 'smut,' he is almost without exception referring to bunt or stinking smut, so called from the objectionable smell it has, and which is quite noticeable even if only a little be present in a large quantity of grain. There are considerable differences between the two smuts; but, from the wheat-grower's standpoint, the chief one is that 'smut' (bunt) can be readily prevented by treating the seed wheat before it is sown, whilst 'loose smut' requires special treatment of the seed for its prevention in the resulting crop.

"As 'loose smut' requires special treatment of the seed-grain for its prevention, the most practical way of getting rid of it, after it has made its appearance on a farm, is to use for seed only grain which is known, as the result of an examination of the growing crop at the proper time, to be entirely free from this disease. To determine whether 'loose smut' is present in a crop the examination should be made when the plants are flowering.

What is Smut ?

"In order to understand the reason for treating seed to prevent 'smut' it is necessary to know what 'smut' is. Some are under the impression that 'smut' is a fungus disease which exists in the ground. Such is not the case. The minute black particles which are found adhering to a wheat-grain, and which are commonly called 'smut,' but which would be more correctly called 'bunt,' are the seeds or 'spores' of a plant, just as the grains of wheat are the seeds of another plant. These

spores, unless their vitality is destroyed, will, when sown with the wheat, germinate and grow with the wheat plant, living upon its tissue, and be the cause of the producton of a 'smutted' wheat-ear. The object of any treatment is to destroy the vitality of these 'smut' spores without injuring the vitality of the seed grain.

"It may be thought that the plant may also become affected with 'smut'' as the result of infection from the ground which has previously had smutty crops growing on it. Experiments have shown that this is not the case, and it is now known that the chief (almost the only) cause of 'smut' is the sowing of seed which has healthy spores adhering to it. It follows, therefore, that if the vitality of these spores can be destroyed, that grain crops will be 'clean.' Methods have been introduced for successfully destroying the vitality of the spores, but no practical method has yet been devised for killing the 'smut' plants after they have germinated. Occasionally, as in the case of self-sown crops, the natural conditions prevailing at the time the seed is planted are the cause of a 'clean' crop being produced from untreated smutted seed; but to depend upon this chance method of obtaining clean crops is very unwise and likely to lead to disappointment. It is far wiser and more business-like to destroy the vitality of the spores, and thus prevent them growing.

"Whilst the methods recommended for treating seed grain will destroy the spores which have become free from the bunt balls, none of them is effective for destroying the spores which are contained in unbroken bunt balls. It is therefore necessary, if any treatment is to be effectual, that the unbroken bunt balls be either removed or broken before the seed is 'pickled.' If this is not done, the bunt balls, during the subsequent operation of planting, are likely to become broken, and their uninjured contents dispersed over the treated grain, thus nullifying the effect of the treatment; for the effect of the treatment is to destroy the spores adhering to the grain; it does not render the grain immune to the attacks of 'smut.'

"It has been calculated that in a single bunt ball, no larger than a grain of wheat, there are about 4,000,000 spores, each of which is capable of causing one wheat plant to be smutted. In a bushel of wheat there are 600,000 to 1,000,000 grains. There are, therefore, in a single bunt ball, enough spores, if regularly and evenly distributed, to provide each grain in a bushel of wheat with from four to six spores. The great necessity for removing or breaking the bunt balls, so that the fungicide can act upon their contents, is obvious.

"It is easier to remove the bunt balls than to ensure that all are broken, and, fortunately, this can be done in most cases without any great difficulty. Bunt balls are lighter than wheat and float in the water, so that if the wheat to be treated is poured slowly into the 'pickle,' and in such a way that the bunt balls will not be carried down by the grain, they will float on the top, and can be skimmed off and destroyed. As a further precaution, and in order to release any bunt balls which may have been carried down by the grain, the grain should be stirred or raked; this is also likely to break up any partially broken bunt balls which have sunk and become soft.

"Until bunt-resisting varieties have been produced, and are in general cultivation, to ensure clean crops it is advisable to assume that all seed is more or less smutty, and requires to be 'pickled,' for, seeing that the spores are so minute, it is quite possible for enough to be present on the seed grain to cause considerable smut in the resulting crop, and yet for their presence to escape notice.

THE BLUESTONE TREATMENT.

"The most popular fungicide for treating seed grain, and the one in most general use, is bluestone (copper sulphate). The efficiency of this fungicide depends upon bringing the 'smut' spores into contact with a solution of bluestone for a sufficient length of time to destroy their vitality. Various plans are adopted for attaining this object. Whatever method is adopted, it should be done with sufficient thoroughness to ensure that no spores escape coming into contact with the fungicide long enough to destroy their vitality. A weak solution requires a relatively longer time to destroy the spores than a strong one does. At one time it was the common practice to 'steep' the seed in a weak solution (½ per cent.) for twelve hours, but this method has now been almost superseded by methods which require the seed to be 'steeped' for a few minutes—three to five—in a stronger solution of, say, 2 per cent.

"Bluestone when used alone, and not in combination with lime, or lime water, very injuriously affects the germinating power of the seed. Under some conditions, as much as half the seed treated is destroyed, or the vigour of the resulting plants so weakened that they are practically valueless. The ill-effects can be almost entirely prevented by sprinkling the treated seed whilst wet with air-slacked lime or wood ashes, or by immersing it for a few minutes in lime water. Lime water is made by mixing freshly burnt (lumpy) lime in water, say 2 lb. of unslacked lime in 20 gallons of water. If freshly burnt lime is not available, the seed should be sprinkled with air-slacked lime or wood ashes. Air-slacked lime is not soluble in water, and therefore lime water cannot be made by mixing air-slacked lime and water together."

AN INGENIOUS WATER-LIFTER.

About twenty years ago, half a mile north of the town of Auburn, South Australia, there was what was then known as the "open section" (says a correspondent). This was purchased and the greater portion of it subsequently sold to the Government to be cut into working men's blocks. The Watervale Creek runs through the properties, the proprietors of which make good use of the waters. Excellent fruit and vegetable gardens have been planted. Mr. Mellar, an owner of one of the sections, a mason by trade, has built a small dam across the creek, and on the east side cut a channel, along which the water runs to his vegetables. On the western side he has cut another channel, which leads to a simple but ingenious water-lift, for which he has obtained the protection of the Patent Office. The invention is dependent upon a running stream, and by its aid seems a near approach to perpetual motion. The water moves along the channel, over a couple of sheets of galvanised iron, and falls into troughs attached to a "spider" (the beaters of a reaper were used for experimental purposes).

On the end of the spindle on the "spider" outside the bearings is a sprocket wheel, and around this is an endless link chain with buckets similar to those in the elevator of a harvester; above, on a strong stand, the chain travels around another sprocket wheel. The water falling into troughs turns the sprocket below, the buckets automatically fill with water, and pour the contents into the receptacle placed on the stand. No matter how small the stream may be, the machine will work. It requires practically no attention, and has this advantage over a windmill that on hot days, when a supply of water is desired and the atmosphere is generally calm, a good quantity of water can be raised.—"Adelaide Observer."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF AUGUST, 1911.

AYRSHIRES.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
		Lb.		Lb.		£ s. d.
Auntie	31-7-1911	1,616	3·8	68·43	1s. 1d.	3 14 1
Queen Kate ...	10-12-1910	717	5·1	40·97	„	2 4 5
Lerida	15-2-1911	751	4·8	40·63	„	2 4 0
Lady Margaret ...	4-2-1911	747	4·8	40·41	„	2 3 9
Rosebud	24-6-1911	764	3·9	33·25	„	1 16 0
Lark	22-12-1910	630	4·6	32·60	„	1 15 4
College Lass ...	23-8-1910	535	5·2	32·5	„	1 15 2
Davidina	7-10-1910	566	4·9	31·28	„	1 13 11
Linda	12-2-1911	553	4·2	26·01	„	1 8 2
Laurette	7-6-1911	458	4·7	24·23	„	1 6 3
Lavinia's Pride ...	13-10-1910	418	5	23·26	„	1 5 2
Lass	6-11-1910	361	5	20·38	„	1 2 2
Twelve cows ...	...	8,116	56	413·95		22 8 5
Average ...	...	677	4·7	34·49	„	1 17 4

Lady Margaret, Queen Kate, and Davidina, Imported—First calf.

HOLSTEIN.

Daisy	2-2-1911	773	3·7	31·82	1s. 1d.	1 14 6

GRADES.

Cow.	Breed.	Date of Calving.	Milk (lb.)	Test.	Butter (lb.)	At per lb.	Value.
							£ s. d.
Lemonade ...	Guernsey-Shorthorn	28-6-11	397	5·3	24·72	1s. 1d.	1 6 9
Nancy	Ditto	9-8-11	516	3·8	21·84	„	1 3 8
Two cows ...	...	...	913	9·1	46·56		2 10 5
Average ...	...	...	457	4·6	23·28	„	1 5 3

SHORTHORN (ILLAWARRA).

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
		Lb.		Lb.		£ s. d.
Nellie II. ...	30-11-1910	444	4·6	22·97	1s. 1d.	1 4 11

JERSEYS.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
Cocoa	1-5-1911	498	4·4	24·59	1s. 1d.	1 6 8
Careless	16-12-1910	420	4·7	22·73	,,	1 4 7
Eve	27-6-1911	471	4	21·04	,,	1 2 10
Bluebell	20 4-1911	370	5	20·89	,,	1 2 7
Four Cows ...	...	1,759	18·1	89·25		4 16 8
Average ...	...	440	4·5	22·31	,,	1 4 2

AVERAGE FOR AUGUST, 1911.

No.	Breed.	Milk (lb.)	Test.	Butter (lb.)	At per lb.	Value.
						£ s. d.
12	Ayrshire	8,116	56	413·95	1s. 1d.	22 8 5
1	Holstein	773	3·7	31·82	,,	1 14 6
2	Grades	913	9·1	46·56	,,	2 10 5
1	Shorthorn	444	4·6	22·97	,,	1 4 11
4	Jerseys	1,759	18·1	89·25	,,	4 16 8
20	...	12,005	91·5	604·55		32 14 11
	Average	600	4·6	30·23	,,	1 12 9

Average cow value £1 12s. 9d. for August, 1911.

The following cows, namely—Auntie, College Lass, Daisy, Davidina, Lady Margaret, Lark, Lass, Lavinia's Pride, Lerida, Queen Kate, and Rosebud each received the following daily ration:—20 lb. panicum chaff, 3 lb. boiled barley, 1 lb. oil cake, 4 lb. bran, 2 lb. pollard, 1 lb. treacle, and grazed on lucerne stubble.

The other cows received daily 30 lb. panicum chaff, 1 lb. treacle and grazed on the natural pasture.

N.B.—The chaff fed was of an inferior quality.

Cost of feeding for month per cow—

		£ s. d.
620 lb. Panicum Chaff at £1 10s. per ton	=	0 8 4
93 ,, Barley ,, 3s. per bushel	=	0 4 8
31 ,, Oilcake ,, 8s. per cwt.	=	0 2 3
124 ,, Bran ,, £4 10s. per ton	=	0 5 7
62 ,, Pollard ,, £4 10s. ,, ...	=	0 2 10
31 ,, Treacle ,, 3s. 6d. per cwt.	=	0 1 0
		£1 4 8
930 lb. Panicum chaff at £1 10s. per ton	=	0 12 3
31 ,, Treacle at 3s. 6d. per cwt.	=	0 1 0
		£0 13 3
11 Cows at £1 4s. 8d.	=	13 11 4
9 ,, ,, 13s. 4d.	=	5 19 3
Total Cost of Feeding for August		£19 10 7
Commercial Butter Returns		£32 14 11
Profit		£13 4 4

PURCHASE OF SHORTHORN CATTLE AT THE DUBLIN SPRING CATTLE SHOW.

The Irish Shorthorn Breeders' Association has brought under the notice of the Queensland Department of Agriculture and Stock the opportunity afforded by the Royal Dublin Society's Spring Show for procuring young bulls and heifers of high standard and with excellent pedigrees. The show is held in Dublin in April of each year, and at the 1910 sale 273 Shorthorns were disposed of by the auctioneers appointed by the society at an average price of £33; and of these a considerable number were purchased for export to the Argentine and other foreign countries, where they were disposed of at very remunerative prices. One Irish bull purchased for £105 made the second highest price (£1,232) at Mr. McLennan's sale in Buenos Ayres at much higher prices in England and Scotland. As an indication of the keenness of Irish breeders, it may be mentioned that the highest-priced bull at the Scotch sales last autumn was purchased for service in Ireland.

Poultry.

REPORT ON EGG-LAYING COMPETITION, Q.A. COLLEGE, AUGUST, 1911.

Two thousand seven hundred and twelve eggs were laid during the month, an average of 113 per pen. Most of the birds are now doing good work. The Range Poultry Farm and Mrs. Kinnear divide the monthly prize with 137 eggs each. The following are the individual records:—

	August	Total.
Range Poultry Farm, White Leghorns	137	520
J. F. Dalrymple, N.S.W., White Leghorns	135	519
Yangarella Poultry Farm, White Leghorns	112	513
E. A. Smith, White Leghorns	134	498
Alex. Smith, White Leghorns	118	482
J. Holmes, White Leghorns	136	479
A. Hollings, N.S.W., White Leghorns	119	462
Cowan Bros., N.S.W., White Leghorns	118	454
Jas. McKay, White Leghorns	119	442
Mrs. Kinnear, S.A., White Leghorns	137	441
A. J. Cosh, S.A., White Leghorns	113	430
S. Chapman, Brown Leghorns	134	404
J. Gosley, White Leghorns	132	403
H. Hammill, N.S.W., White Leghorns	106	392
R. Burns, White Leghorns	116	389
A. H. Padman, S.A., White Leghorns	86	379
R. Burns, S.L. Wyandottes	113	350
J. Zahl, White Leghorns	101	333
A. Astill, White Leghorns	101	280
Mrs. A. A. Carmichael, Brown Leghorns	113	266
R. W. Goldsbury, White Leghorns	118	225
J. K. Stewart, White Plymouth Rocks (No. 1)	71	131
J. K. Stewart, White Plymouth Rocks (No. 3)	86	105
J. K. Stewart, White Plymouth Rocks (No. 2)	57	66
Totals	2,712	8,963

The Orchard.

SHIELD-BUDDING THE MANGO.

We have received a communication from Mr. P. J. Wester, Horticulturist, Bureau of Agriculture, Manila, on the subject of budding the mango, in which he takes great interest, and who has asked for information concerning what is being done in this matter by orchardists in Queensland. All available information has been supplied to Mr. Wester by letter from this Department through Mr. Ross, Instructor in Fruit Culture. The following is an article supplied by Mr. Wester to the "Rural New Yorker," which will doubtless be of interest to orchardists and nurserymen:—

"Shield-budding of the mango has been with partial success practised in Florida for at least six years by experimenters in the propagation of this fruit; the writer first experimented with this method with some success in 1904. The percentage of successful buds was, however, so low that he did not then feel justified in calling this method to the attention of the public, and the experimental work was temporarily suspended. However, experimentation has been continued by a few men interested in the problem, in some instances meeting with remarkable success. The success achieved by Mr. Orange Pound, Cocoanut Grove, Fla., deserves special mention, not only for the difficulties that he has successfully surmounted, but for the public-spirited way in which he has placed his data at the disposal of the writer for publication for the information of other mango-growers. It is not too much to say that Mr. Pound's discovery marks an epoch in the mango industry, not only in Florida, but in other parts of the world. Mr. Pound recently obtained, with this method, over 85 per cent. of healthy trees among a lot of 300 plants budded, a most gratifying result.

"Success depends on the prime condition of the stock plant and that the sap is flowing freely; the buds should be selected from well-matured wood that is still green and smooth, of the first, second, and third flushes from the terminal bud, and cut rather large, 3 to 5 centimeter long (1¼ to nearly 2 in.). The lower, thick part of the leaf stem at the bud should not be trimmed off, but allowed to remain on the bud until it is shed voluntarily. If the leaf stem or petiole, as it is also called, is cut too near the bud, fungi frequently gain entrance through the wound and destroy the bud. It is possible that the leaves can to advantage be trimmed off the bud wood while it still remains on the tree, and the bud wood be used after the petioles have dropped and the leaf scars are well healed. It appears to be equally satisfactory to push the buds up or downward. To facilitate the insertion of the bud, it is well to trim off the edge of the horizontal cut. In tying the bud, allow the remnant of the petiole to stick out between the strands of the tape, and protect it and the bud from the sun and rain with a square piece of wax cloth held in place by one of the strands of the tape above the bud. It is essential that the buds should be inserted at a point in the stock where the bark is of about the same age as the bud wood—*i.e.*, green and smooth—and the work done when the plant is in flush. When the union has been effected, which will be in the course of two or three weeks, the stock should be pruned off about 6 in. above the bud. The buds are sometimes very dilatory about starting, and in order to force them out the plants should, after the buds have taken, frequently be gone over and all adventive buds rubbed off.

"In top-working old seedling trees the same principle obtains. Part of the main branches are then pruned off to 1 to 2 ft. from the trunk,

Plate XIV.

Shield-budding the Mango.

Tapping in Uganda: the Swahili Method of Climbing.

and the resulting sprouts are budded and treated in the manner already described. As the buds increase in size, the native top is gradually removed; care should be taken, however, not to prune the tree too severely at one time, as it is then apt to become permanently injured and die from such treatment.

"In, to some extent, employing another method called by the originator 'slice-budding' matured bud wood sufficiently old to have turned brownish or greyish, is also used in top-working seedling trees planted at stake. The bark of the part of the stock where the bud is inserted, or more correctly placed, should exhibit the same character. For all practical purposes this is identical with the chip-budding method employed in the propagation of pecans. The work is performed by cutting a slice or chip of bark and wood from the stock in the same manner as if the removed part was to be used as a bud; a shield bud just large enough to make a snug fit is now cut from the bud stick and placed on the cut and tied in the usual way. In using either of the methods of budding described above, the stock should at the time of budding be girdled 6 to 9 in. above the bud.

"Mr. J. E. Higgins, Horticulturist of the Hawaii Agricultural Experiment Station, Honolulu, Hawaii, in Bulletin 20 of that station, describes a method of shield-budding the mango that has recently been tried with success there. An unusually large bud, 3 to 3½ in. long, is recommended, and that the buds be inserted on well-matured stock where the bark is rough and brownish, using bud wood of the same character."

VEGETABLE SPONGES.

The vegetable sponge belongs to the same order—Cucurbitaceæ—as the melon, pumpkin, cucumber, &c. It grows freely in Queensland, and bears heavy crops. There does not appear to be a great sale for them in the State, although many are sold in the chemists' shops. Under the name of "Loofah," it grows and fruits freely in many tropical countries. The botanical name of the plant is *Luffa Ægyptiaca.* The method of preparing the sponges for market is thus described in the "Agricultural Journal" of the Cape of Good Hope:—The fruits should be allowed to remain on the vines until they have acquired a yellowish tint, but not until they have begun to assume a brown colour, as this indicates that the outer skin of the gourds is undergoing decay, which will cause the fibrous structure within to become discoloured. The fruits should be cut from the vine with about 2 in. of stem attached, for convenience of hanging. They should be hung in an airy, draughty shed for two or three days, and the outer skin will then be found to be fairly soft and pliant; this stage of the preparation is assisted by cutting off the tip of the gourd at the lower end, leaving a small hole through which the contained moisture may drip. The loofahs may next be removed by running the finger down the skin of the fruit on one side, splitting it open, and turning out the loofah, which is at once thrown into a washing vat containing lime water (5 lb. of slaked lime to 60 gallons of water). The loofahs are stirred about in the lime water for a few minutes, and then removed to a draughty shed to dry. Care should be taken to shake the lime water out of each loofah before drying. If the loofahs are dried too quickly, they are apt to become brittle and crack; they must not, however, remain damp too long, or they may become mouldy, though the lime prevents this to a large extent, and is, indeed, used in order to protect them from fungoid growths. When the loofahs are dry, the seeds may be easily shaken out of them by hand, and when this is done they are ready for the market.

Sericulture.

SILK CULTURE IN NEW SOUTH WALES.

The success of the Brisbane Silk Culture Association, due mainly to the perseverance and energy of Mrs. South, has stimulated many people in Sydney to follow Queensland's example in the matter of sericulture, and, since Mrs. South's admirable lecture on the subject in the neighbouring capital, a Silk Culture Society has been formed there on similar lines to the Queensland association. The "Farmer and Settler" writes on this subject:—

"Most of us, when at school, were the proud possessors of silkworms. Sometimes we tired of them, when they were tiny creeping things which we were almost afraid to handle; sometimes we had the pleasure of seeing them curl their grey-white bodies into a corner of their box, and spin; sometimes, and this was rather often, we let the moth eat its way out before we wound off the silk; just a few of us had the pleasure of winding off quite a nice little knot of silk for a book mark, &c.

"That is as far as our silk-growing went. Now, however, both school children and grown-ups sufficiently interested in this hobby will find it more remunerative, since a society similar to the Brisbane Silk Culture Association has been formed in New South Wales, as the outcome of a lecture delivered in Sydney recently.

"At the lecture, the secretary, Mrs. South, pointed out that the initial expense was so very small that any girl or boy, man or woman, would find it worth his or her while to take it up. For 1s., 500 or 600 eggs could be bought—eggs which are imported from Italy to ensure their being of a good strain. As to feed, one mulberry tree provides sufficient for millions of silkworms, mulberry leaves being their ideal food. As the mulberry tree grows to perfection in our country, and the worm is free from any of the diseases which attack it in other lands, there seems to be no reason why silk-growing, as an industry, should not, in the future, prove a source of wealth to Australia, but just now it is as a fairly remunerative hobby only that we can deal with it.

"It was proudly pointed out by the lecturer that when she displayed a sample of Australian-grown silk to the most important firms in America they one and all declared the silk to be of a very high texture, fine finish, and good colour, and said that if the bulk required were produced it would find a market in America.

"The worms do not need much attention; an hour or so at night would cover all that is required for about two months in the year. For the other months they just need feeding; if an old wire mattress is used, the four legs stood in tins of water to prevent ants working havoc among the silkworms, the work is simplified wonderfully. New leaves are daily placed on the wire, and the worms instinctively make for them. A daily sweeping under the mattress is all else necessary.

"Once the worms have completed their spinning, the cocoons are put in a moderately hot oven on a thick sheet of paper, or in a pillow slip,

for about twenty-five minutes. The heat kills the grub inside the cocoon, and keeps the silk quite good; just two or three cocoons are kept out of the oven for the sake of the moths which are to furinsh the next lot of eggs.

"These cocoons the Brisbane Society have been buying in at the rate of 2s. to 3s. per lb., and, as an instance of the success of the association, the secretary mentioned that, whilst they bought in 30 lb. of cocoons the first season, they purchased 130 lb. in the second—a decided increase.

"One school teacher, a very busy woman, too, bought her shilling's worth of eggs from the association the one year, and the next made £2 15s. by selling her cocoons and 10s. by the eggs which she did not want.

"As you will readily see, silk-growing on a small scale would never earn you a living, but it makes a profitable pastime, the outlay meaning practically no expense outside the small cost of the eggs.

"At their display at the recent Girls' Realm Guild Exhibition, the Brisbane Association showed beautiful knots and skeins of silk—pure white, yellow, and cream—which they had, by means of a twisting machine, wound from the cocoons. Their knowledge was gained from an Italian expert, whom they engaged to teach them the whole process.

"A myth which generally possesses amateur silkworm-owners is that, if the worms are fed on different leaves, the silk will be of various colours. I distinctly remember, when at school and the proud possessor of silk worms, regretting the lack of strawberry leaves, as I was under the impression that the worms fed on these dainty leaves would produce pink silk, those on lettuce leaves green silk, and so on. But it is not so; the Italian eggs produce yellow silk, and the Japanese white. The thread is washed and boiled for two hours, then dried in mosquito net, and dyed to any colour desired, before being woven into material. The food makes no difference whatever to the colour of the silk. Grape leaves, lettuce, &c., will be readily eaten by the worms; but to feed them on such means the production of inferior silk to that produced by silkworms fed on mulberry leaves."

ELECTRICITY IN SHEEP-BREEDING.

Professor Silas Wentworth, of Los Gatos, California, gives some curious information as to his experiments with electric influence on animal and vegetable life at his Experimental Farm on the Tyler Ranch, near Roseville. He states that the results of this work during the past year have proved that electricity more than doubles the lamb crop, and greatly increases the yield of wool. A flock of 2,000 sheep was divided, one-half being placed in a field under the power wires of the Great Western Power Company, whilst the other half was removed from electric influences. In the field under the electric power line the production of lambs averaged a fraction over two lambs to each ewe; in the adjoining field, where electrical influence was lacking, the lamb average was less than one to each ewe. Similar differences were noted in the yield of wool from the sheep in the two fields under notice. The fleeces from the sheep in the electrically influenced pasture proved to be 20 per cent. heavier than in the other cases. It is also stated that preparations have been made to plough up both fields and plant wheat, when the effect of the current on the growth of that cereal will be tested, and the results are awaited with a great deal of interest.—"Live Stock Journal."

Tropical Industries.

COFFEA ROBUSTA.

Rubber planters in new tropical countries who have not had any experience of rubber planting in older rubber districts are much divided in opinion as to the most suitable catch crop, which, planted between the rows of rubber trees, will serve the twofold purpose of keeping down weeds and of giving some annual return until the rubber trees have arrived at the tapping stage. Amongst the various crops grown for these purposes are cotton, yams, sweet potatoes, coffee, &c. Coffee appears to be much in favour in some rubber countries, and the variety *Coffea robusta* would seem to be better for the purpose than *C. arabica* or *C. liberica.*

We have received from Mr. Stuart R. Cope, London, an abstract of a paper on *Coffea robusta* which was published in the "Agricultural News of Barbados," and we republish it, as the information it furnishes on the subject will, we think, be of great value to intending and to already established planters in Queensland. Mr. Cope's planting leaflet says:—

The following information is taken from Dr. P. J. S. Cramer's paper on *Coffea robusta* as an intercalary crop with Pará rubber, which appears in the "Bulletin de la Société Belge d'Etudes Coloniales," for February, 1911. This commences by referring to the origin of *Coffea robusta,* which Dr. Cramer considers to be identical with *Coffea Laurentii;* this species is as distinct from *Coffea arabica* and *Coffea liberica* as these are different from one another, and requires conditions quite other than those needed by these, for its proper growth. In the history of the distribution of the species, it was first obtained from Brussels in 1900 for planting in the east and centre of Java, where it was considered as a curiosity until two years later, when its large power of production came under observation. Since 1907, there has been a great extension of the area of *Coffea robusta* in Java; the estimated area in 1907-8 was 5,000 acres, and 1908-9 from 20,000 to 30,000 acres, and it is probable that this estimate is below the actual extension. No other kind of coffee is being planted at present, to any extent, in Java.

CLIMATE.

Experiments in Java show that this coffee will flourish from sea-level to an altitude of 3,000 ft. The best plantations are found in the humid districts of East Java, where there is a large rainfall distributed equally during the year. These estates are situated from 1,000 to 1,500 ft. above sea-level, and the soil is deep and rich in vegetable matter. The plant is capable of resisting drought to a certain degree, but prefers an abundant and regular rainfall. In the south of Java, it has survived a dry period lasting nearly four months; the trees suffered to some extent, but recovered very quickly after the first rain. In Java, Robusta coffee is always planted under shade; in connection with this, the shade given by Pará rubber trees would be insufficient on account of its inequality, and its absence for part of the year owing to the loss of the leaves. The plant suffers severely if exposed to the wind, and, where such exposure is likely to occur, it is useless to attempt to grow it unless measures are taken for its protection.

SOIL.

The roots of *Coffea robusta* are strongly developed, and it is noticed in the nurseries that they largely occupy the top soil. It is on this account that the soil conditions should be as favourable as possible for the development of the roots. It has been found that the plant grows very quickly on volcanic soils, and on those which are rich in vegetable matter. The growth is much slower in compact and clayey soils.

COFFEA ROBUSTA AS AN INTERCALARY CROP.

The article summarises the advantages that should be shown by an intercalary crop, in the special connection, as follows:—It should not injure the Pará plants in any way; it should yield a harvest as soon as possible; its cultivation should not entail any specially skilled labour; the preparation of the products from it should not require the employment of any costly machinery. In regard to these matters, the cultivation of coffee is very simple, and *Coffea robusta* possesses a special advantage on account of its quick arrival at maturity, by which it is enabled to give a small yield two years after planting, and, usually, a complete crop in the third year; under normal conditions, Robusta coffee planted between rubber will give, at the end of the last-mentioned period, a crop of 15 cwt. per acre. The most important matter, however, is that the presence of the coffee does not interfere with the development of the rubber. Observations are given in support of this, as well as of the fact that coffee planted with rubber grows as well as that which is being raised alone.

NURSERIES FOR *COFFEA ROBUSTA*.

Nurseries for *Coffea robusta* require much care. They should be capable of providing a deep shade, which can be diminished gradually as the plants become older, in order to accustom them to the sun before they are planted out. The seeds should not be planted more closely than 6 in. apart, as such a distance will enable the plants to be kept longer in the nurseries, so that they will not be planted out before they are ready—that is, when they possess four or five pairs of leaves. The best method is to keep the plants in the nursery for nine months, and then to place them out as stumps. When this is done, the most useful plan is to sow the seed very thickly in a germinating bed, and then to put the best plants out in the nursery at a distance of 1 ft. apart. The chief objection to the use of stumps is that they yield their first crop later than trees that have been put out as seedlings. If it is necessary to have the plants in the ground very quickly, these methods are too slow, and it is of interest that *Coffea robusta* can be transplanted at almost any age, for plantations exist that have been made from seeds that had just germinated as well as from plants that have been raised from seed at stake. In the examples of this seen by the author, although the plants were only six months old, flower buds had formed in the axils of the leaves on the lower branches. It is pointed out that a similar method of planting could not be employed successfully with any other species of coffee.

PLANTING OUT.

If seedlings are to be employed, these should be planted out, in the ordinary way, with a ball of soil adhering to the roots; with stumps, this is not the case, all that is required being to cut the tap root back a little, while the lateral roots are untouched. The distance for planting depends upon that between the Pará rubber plants. As a basis, 6 ft. may be taken as the least distance between the coffee plants, and 7 ft. between

the rubber and the coffee. If the rubber trees are planted in lines well apart, it is best not to plant coffee in the rows, because this would prevent the rubber from being seen as a whole, and to plant the rows of rubber from east to west, in order to ensure the largest supply of light to the coffee between the rows.

TOPPING, PRUNING AND CARE OF A YOUNG PLANTATION.

Robusta coffee possesses a strong tendency to form solely primary branches, during early growth, so that it is necessary to top the trees in order to prevent their growing too tall; if the top is removed, the principal branches form secondary branches which are not inferior to the former from the point of view of production. Another method for encouraging the growth of secondary branches is to expose the young plant to direct light. Very little difference in yield has been found from topped and untopped plants. The sole disadvantage of topping is the formation of suckers at the top of the trunk; these should be removed regularly, and this includes all the pruning that is required, except in the case of old trees that have produced suckers near the base on account of injury. The care of a plantation of *Coffea robusta* is certainly less expensive than that of one containing Liberian coffee; epiphytes do not grow upon it, and it shades the ground completely—in fact, the expenses of its cultivation are less than those entailed in the clean weeding of a rubber plantation. If weeds happen to become abundant, the coffee does not die, but ceases to produce fruit, and is capable of recovering in a few months. When they are one and a-half year old, the trees may be topped at a height of 8 ft., and after they have been topped they reach their full development in three years.

TIME OF FLOWERING AND YIELD.

The first flowering takes place a year after planting, though cases are known in Sumatra when the period has been eight months; in the latter case, sterile flowers were formed after seven months, and the normal flowers appeared a month later. After flowering, the time for the formation of ripe fruits may be taken as nine months; thus trees of the latter kind would yield a harvest in two years. The plant flowers during the whole of the year, resembling *Coffea liberica*; nevertheless, the climate has some effect on production, and the crop is increased in amount during the dry season. The berries remain on the branches for about a month, so that a monthly picking is necessary.

Examples are given of the yields on plantations. In one case where the plants were placed at the corners of a 12-ft. square with another plant in the centre, the yields per acre at the different ages of the plants were as follows:—Two years, 1.5 cwt.; three years, 5.5 cwt.; four years, 17 cwt.; five years, 15 cwt.; six years, 21 to 24 cwt. In another case, the plants were at 10 by 10 ft., with a nutmeg tree in the place of every ninth coffee plant, when the yields were, similarly, as follows:—Two years, 1.5 cwt.; three years, 1 cwt.; four years, 17 cwt.; five years, 17 cwt. Other examples of yields are presented, and the following course of a plantation of Robusta coffee with rubber is given as satisfactory under the conditions mentioned:—The flowers should appear in the first year after planting. In the next a small crop of about 1 to 2 cwt. should be obtained, and this should increase to 14 cwt. per acre in the third year, with the same production in the fourth year. In the fifth year, the shade of the rubber trees would become too thick, and only the trees in the middle of the rows would give a crop; this would be about 7 cwt. per acre. In five years the coffee plants should be removed, as the shade of

the rubber trees would by now make their yield unsatisfactory. These figures apply only to conditions where the rubber trees are planted at a suitable distance from the coffee—namely, at least 7 ft.—and where the conditions of soil and climate are favourable to intercalary cultivation.

PREPARATION FOR MARKET AND QUALITY OF THE PRODUCT.

The berries are smaller than those of Liberian coffee, and are borne in thick bunches, so that picking is facilitated and hastened. The fruit covering is thin, and there is another advantage in that the skin is easily removed. The seeds are fermented for thirty-six hours, and then washed and dried; for the lastnamed purpose they should be exposed immediately to a temperature of about 60 degrees C. The quality of well prepared Robusta coffee is about equal to that of Arabian coffee of middling quality; the seeds are slightly different in shape, being larger and more convex than those of Arabian coffee. The bulk is about the same, and Robusta coffee possesses a bluish-green colour similar to that of good Arabian. The market price is about 10 per cent. below that of Java and Liberian coffee, but there is ample compensation for this disadvantage in the difference of expense in production.

In relation to the cost of establishment of a plantation, it must be remembered that the driers and buildings required for the coffee will be of use later in connection with rubber production. Final matters of interest in the present relation are that Robusta coffee is ranked by brokers with good Java coffee, and above Santos; for its proper preparation the seeds should be well roasted—a process to which they lend themselves well, and under which they lose less weight than those of other kinds of coffee.

INSECTS AND DISEASES.

The only insect dangerous to *Coffea robusta* that has been noticed so far is *Xyleborus coffeae*, Wurth, which bores holes in the branches; the damage from this is lessened by topping the tree and encouraging the formation of secondary branches. The most serious disease is caused by *Corticium javanicum* (see "*Agricultural News,*" Vol. IX., pp. 286, 318, 334, 383, and 414). In the treatment for this, it is advised that the trees be cut down, and the sucker which arises be topped and allowed to take the place of the old plant. Frequent and thorough examinations should be conducted for the detection of Corticium. Lastly, *Coffea robusta* is only slightly attacked by *Hemeleia vastatrix,* and the root disease which is so serious in regard to Pará rubber is never found on the living roots of the coffee, so that there appears to be no fear of an increase in the amount of this disease in Pará rubber through the intercalary cultivation of *Coffea robusta.*

RUBBER SHARE MARKET.

According to Messrs. Zorn and Leigh-Hunt, the gamblings of several none too powerful operators in the raw material played sad havoc with the realisable value of investors' rubber share holdings up to the end of May. As the result of the financial trouble of the speculators in question, the price of Hard Fine Pará has come down to 3s. 11d. per lb. Though the very best plantation stuff fetched 5s. per lb. at the recent auction, the price of average parcels is about 4s. 5d., and shareholders are asking "How much lower?" Inasmuch as the price (3s. 11d.) of Hard Pará is beginning to show only a comparatively small margin of profit to Brazilian merchants—reckoning the collecting cost at 2s. 6d. per lb.—we think

that the end of slumping prices must be getting near. Whatever may happen in the immediate future, it is pretty certain that the amount of money available for the dispatch of the Amazon collectors for next season's output will be greatly restricted by the present state of affairs, and this means a considerably diminished Brazilian output. A smaller production of wild rubber and an increasing consumption do not mean permanently lower prices for rubber, and when the turn comes we look for sharp movements in both material and shares. The advance in the output of plantation rubber for the next twelve months or two years is not likely to be large enough to affect this result. We strongly commend to the attention of investors in the rubber-planting industry the lucid and common-sense statement of the whole position made by Mr. Arthur Lampard in the course of his speech as chairman of the annual meeting of the Malayalam Company. Mr. Lampard pointed out that, upon the occasion of the last great slump in the price of rubber (in the early part of 1908, at the time of the financial crisis in the United States), a state of affairs was created which led to the pendulum swinging in the other direction to such an extent that we saw rubber mount to the record high figures of last year. In March, 1908, there was heard on all sides the same sort of silly pessimistic talk as is now so much in evidence; but the rubber-planting industry soon proved that it was not "done for," and those observers who can look ahead for more than a few days or a few weeks know that it is not "done for" now.

A point to which we have already called attention—viz., the dwindling margin of profit available (with three-and-eleven-penny rubber) for Brazilian rubber collectors (allowing 2s. 6d. per lb. for expenses) as an important factor likely to give pause to even the most reckless bear—has, the week ending 8th June, been emphasised by the Press, and the argument has, without doubt, been recognised as a powerful one, justifying a belief in quickly-improving values. Many investors have not been slow to take advantage of the low prices at which shares in the rubber-market could be had, and nearly all changes are in the upward direction. Immediately the price of rubber showed signs of appreciation, bargain-hunters appeared in numbers very disconcerting to the bears, and prices have stiffened all round. The change which has come over the market, however, is not shown so much by the improvement in individual quotations as by the distinctly more confident "tone" which is manifest on all sides. The tremors and nervousness, which for some weeks had checked investment buying, have now passed away, and, while no great activity can reasonably be looked for on the eve of the Coronation and the holiday season, the recent slump certainly seems to have come to an end, and to have left the share market in a thoroughly sound and healthy condition.

In answer to "Rubber Dividends," companies that have declared dividends of 100 per cent. and over (according to Messrs. Zorn and Leigh-Hunt's mid-April list) include—

	Per cent.
Anglo-Malay	100
Batu Caves	150
Bukit Rajah	150
Cicely, ordinary	135
Cicely, preference	140
Fed. Selangor	125
Inch Kenneth	100
Luiggi	165
Pataling	325
Selangor	375
Vallambrosa	250

50 per cent. and under 100 per cent.—

Cons. Malay	80
Damansara	75
Fed. Malay States	75
Harpenden	80
Kapar Pará	65
Kepong	65
Klanang	87½
Kuala Lumpur	75

SOYA BEANS.

Last year Corea exported £584,500 of Soya beans, mostly to Japan. The Corean bean is said to be superior to its Manchurian rival, and so large an increase in its export (£200,000, or more than 30 per cent. over 1909) has released that quantity of Manchurian beans, required for the Japanese manufacturers of soya, &c., and enabled them to be sent to Europe, where the demand is rapidly increasing.—" Tropical Life."

MANURING OF RUBBER.

The question of manuring, which for many years had not been a factor in successful agriculture in Queensland—owing to the extraordinary richness of the soil in the agricultural districts, notably on the Darling Downs, and generally in the scrub soils all over the State—has of late, owing to constant cropping without returning anything to the soil, become a matter of necessity. The older sugar-cane fields have long ago received attention in the way of green manuring and the application of artificial manures especially suitable for cane crops with excellent results. The banana plantations in the North have been much neglected in this respect, notwithstanding the published results of exhaustive experiments in the manuring of bananas by the Department of Agriculture and Stock. In some cases the old banana plantations have been planted with sisal hemp, and now rubber is likely to be largely planted either in conjunction with or instead of bananas. But rubber trees take a large amount of plant food out of the soil, and it would be foolish to expect them to thrive on exhausted soils, or, what amounts to the same thing, soils from which the chief elements of plant food—nitrogen, potash, and phosphoric acid—have been largely withdrawn. Rubber trees, except those planted on virgin soils, require manure as well as citrus and other fruit trees and bananas. Those who are now planting rubber trees on worn-out lands will read with interest the following remarks on manuring of rubber by a scientific rubber planter, Geo. A. Cowie, M.A., B.Sc., which appeared in " The India Rubber Journal," 19th April, 1909:—

The query as to how far the low vitality and yielding power of many rubber plantations is due to the want of proper fertility, can only be satisfactorily answered after carrying out suitable manurial experiments on the soils in question. Although this is so, there can be little doubt from the results of experiments already conducted, combined with a knowledge of the principles of plant nutrition, that in many cases the unsatisfactory state of affairs is exclusively due to continued neglect in manuring, or failure to restore to the soil the chief elements of plant food—viz., nitrogen, potash, phosphoric acid, and lime. It is quite true that in the

cultivation of rubber trees comparatively little in the way of these ingredients is permanently withdrawn from the soil, but the small amount that is removed, chiefly in the latex and macerated bark, must be returned if the plants are to maintain their normal vigour and prolifity. No matter how rich the soil may be at first, it is bound to become exhausted, sooner or later, by constant cultivation, and it should not be forgotten that this stage is reached earlier when tea or any other economic crop, as is frequently the case, is grown on the same ground. The question then arises—what kind of manuring should be adopted, or, in other words, in what proportions and forms should the above-mentioned ingredients be applied artificially to the soil in order to suit the needs of the trees.

In the first place, it must be observed that a heavy application of nitrogen is apt to be followed by disappointing results. An excess of this ingredient has often the effect of stimulating the growth of the foliage to such an extent that the trunk becomes too weak to support it, and the whole tree is bent over by the force of the wind. To prevent this and to obtain uniform growth, it is strongly recommended to restrict the quantity of nitrogen within moderate limits and to supplement it with phosphates, and especially with potash which, according to the results of numerous tests, exerts a particularly beneficial influence on the wood of the tree.

The relation between the amounts of nitrogen and potash applied has, no doubt, a great deal to do with success in the manuring of rubber trees. This is well brought out in an experiment on Hevea, conducted by Mr. R. M. Eckert, Vincit, Ruanwella, Ceylon. By the use of a manurial mixture containing 6 per cent. of nitrogen and 5 per cent. of potash, the foliage was developed quite out of proportion to the wood, with the result that the trees were broken down by the wind. A mixture containing 4 per cent. nitrogen and 15 per cent. potash produced, however, quite a different effect, the trees presenting a vigorous appearance and showing uniform growth. The firm and solid structure of their trunks was noticeable.

The benefits accruing from the judicious manuring of rubber are further illustrated by the results of a carefully carried-out experiment at Deli-Moeda, East Coast of Sumatra. Commencing in October, 1906, at which time the trees (Hevea) were two years ten months old, three plots of land were taken and differently treated from a manurial point of view. At the end of two years the circumference of the trees on the different plots were measured, at 1 yard above the ground, and the average for each plot was calculated. The results are shown as follows:—

Plots.	I.—No Manure.	II.—Completely Manured.	III.—Manured without Potash.
Manuring per tree ..	...	2 lb. peanut cake meal ... 12 oz. double superphosphate 8 oz. muriate of potash	2 lb. peanut cake meal 12 oz. double superphosphate
Average circumference of stems	9 inches ...	14 inches	12 inches

From the results of these and other experiments it is clear that potash may be made to play a very important part in the manuring of rubber. While this ingredient may be applied fairly abundantly with advantage,

nitrogen must be used with a little more caution, in order to prevent a too luxuriant growth of foliage. Phosphoric acid is also, of course, indispensable, and, although it may not benefit the wood to the same extent as potash, it serves, like it, to counteract the stimulating effect of nitrogen on the development of the foliage.

Bearing the foregoing facts in mind, we may lay down manurial mixtures of the following compositions, as being suitable for application under different conditions:—

I.

The first mixture is suitable for land rich in nitrogen, and where there is a good leaf growth.

	Potash.	Phosphoric Acid.	Nitrogen.
28 per cent. muriate of potash ..	14	..	..
25 per cent. superphosphate (18)	..	4.50	..
20 per cent. bonemeal (28) (I) ..	..	5.60	0.2
17 per cent. oilcake (6)	..	..	1.3
10 per cent. sulphate of ammonia	..	..	1.6
100 per cent. contains	14	10.1	3.1

400 to 800 lb. per acre to be applied.

II.

The second mixture is recommended for land which is in a poor condition with regard to its nitrogen content.

	Potash.	Phosphoric Acid.	Nitrogen.
20 per cent. muriate of potash ..	10	..	..
30 per cent. superphosphate (18)	..	5.4	..
10 per cent. bonemeal (18/1) ..	..	2.8	0.1
24 per cent. sulphate of ammonia	..	..	4.9
16 per cent. oilcake (6)	..	..	1.0
100 per cent. contains	10	8.2	6.0

400 to 700 lb. per acre to be applied.

As to the forms in which the different plant foods should be supplied, no hard-and-fast rule can be laid down. This will depend on the climate, condition of the soil, and also the kinds of artificial manures at one's disposal. In cases where the soil is deficient in organic matter, it will pay to employ as a source of nitrogen organic manures like fish guano, blood meal, oilcake, or, as in the above case, for the purpose of producing a more rapid effect, a mixture of one or more of these substances with the inorganic manure sulphate of ammonia.

Phosphoric acid can also be employed in various forms, such as superphosphate, basic slag, or bonemeal. While superphosphate is the most active of these manures, basic slag, owing to its high lime content, will be found valuable for soils deficient in this particular constituent. For land which is lacking in organic matter, the use of bones is specially recommended.

Potash may be given in the form of muriate or sulphate of potash, but in many cases muriate seems to produce the better results in the dry climates.

These artificial manures can be sprinkled round the tree at a distance of from 1 to 1 ½ft. from the stem for each year of the plant's growth, and then very lightly forked into the soil. In order to prevent the manure from being washed away by the rain, however, a shallow trench may be cut round the tree, the manure forked therein, and the surface soil then replaced.

Green-manuring, or the system of growing and ploughing into the land special leguminous crops, might also be practised with advantage in the cultivation of rubber. In this way it is possible not only to add to the soil a large quantity of nitrogen from the atmosphere, but also to improve greatly the physical condition of the soil by means of the organic matter. An essential condition, however, to the success of green-manuring is that the leguminous crop in question must be well manured with potash and phosphates in order to ensure a rich production of green plant material. While green-manuring will be found an excellent substitute for farmyard manure in cases where the latter is not available in sufficient quantity, its adoption must be regarded merely as supplementary to the use of artificials.

COTTON-GROWING IN PERU.

In a recent number of "*Peru To-day*" (Vol. III., No. 2), there is presented an account of cotton production in Peru, which is partly a translation and partly an abstract of a study of the subject prepared for the Bulletin of Fomento, of Peru. From this it appears that the most favourable lands for growing cotton in the Republic are situated in the river valleys near the coast, where there is a deep and fine soil formed from the alluvium brought down by the rivers. The kind of cotton most generally grown is the species indigenous to the country, *Gossypium peruvianum*; this is particularly resistant to drought on account of the possession of a large root development.

The article gives detailed information as to the rate of production of cotton in different parts of the area where it is grown. It is of interest that, in the district where Sea Island cotton (*G. barbadense*) is raised, the production varies between 386 lb. and 442 lb. per acre, while the Egyptian variety, Mit-Affifi, in this and other districts, has given a yield of 500 lb. to 830 lb. per acre. As is pointed out, these figures show that the yields of cotton in Peru are much greater than those of other countries. Practically, one may take as an average of Peruvian production per acre, 484.4 lb., against the highest average in the U.S.A. of 308 lb., in Egypt of 390.4 lb., and in India of 70 lb. per acre.

The growth of the cotton industry in Peru is shown by the fact that the exportation of 1903, which was 7,651 tons of lint, value £295,719, was nearly trebled by 1909, the export for that year being 21,370 tons, having a value of £1,211,081. The amount of Full Rough and Moderate Peruvian shipped in 1903 was 2,473 tons, value £103,869; in 1909 it was 7,041 tons, value £378,831. The similar figures for Smooth Peruvian are 1,906 tons, value £176,640, and 13,793 tons, of a value of £795,496. The statistics again show a matter of particular interest in the West Indies in the fact that 535,000 lb. of Sea Island cotton, valued at £36,752, was exported in 1909, whereas in 1903 the export was 271,000 lb., worth £15,209.

The growth in the production of lint has been accompanied by an increase in the exportation of cotton seed and cotton cake. Thus in 1903 the export of cotton seed was 5,348 tons, value £13,371; and in 1909 7,761 tons, value £15,522. As regards cotton cake, the export for 1903 was

2,247 tons, valued at £8,989, while in 1909 it was 4,528 tons, valued at £22,840.

The extent of the cotton-growing industry of Peru may be estimated by combining the total exportation given above with the annual consumption in the factories of the Republic, which amounts to about 2,500 tons of ginned cotton. This gives a total production of about 23,870 tons of fibre in 1909.

The factories possess 1,725 spindles, represent a capital of £300,000, and pay wages annually to the amount of £40,000; the annual value of the products from them may be taken as £220,000. In the oil factories the extraction varies from 12 to 16 per cent.

A study has been made of four-years' cotton production over a definite area, and this has led to the conclusion that the cost of growing a pound of Full Rough Peruvian is 5.7c.; this is very similar to the cost for upland cotton in the United States.

All the facts given in the article, particularly those which are afforded attention above, are employed to show the expediency of a large extension of cotton cultivation in Peru. The proposal is supported by the existence of large areas of land that are available for the purpose, and the fact that cotton grows well where sugar-cane and rice do not flourish on account of the lack of water. Finally, as in the case of the West Indies, the importance is recognised of the adoption of intensive cultivation, and this is recommended as an almost necessary circumstance wherever cotton is grown in Peru.—"Agricultural News, Barbados."

COTTON-GROWING IN THE WESTERN UNITED STATES.

It is generally laid down by experienced cotton-growers that the cotton belt of the United States lies between 36 degrees north and 36 degrees south of the Equator, and that beyond the northern limit excessive frosts preclude the growing of cotton. This has, however, lately been disproved, as cotton has been successfully grown in the North-Western State of Oregon, which lies between the 42nd and 46th parallels of north latitude, on the borders of the State of Washington, and only 180 miles south of British Columbia, where winters are very severe. Should this prove to be commercially successful, there is no reason why cotton should not be grown in all parts of Queensland as well as in the Southern States and Western Australia. "The Board of Trade Journal," of 27th April, 1911, wrote as follows on the subject:—

"Experiments in cotton-growing are being conducted on the Pacific coast, from the Imperial Valley in Southern California to Klamath Falls in the State of Oregon. These experiments are being carried on under the supervision of a Federal Government Inspector. Most encouraging reports are being received from districts so far north that the idea of attempting to grow cotton had never before entered the heads of the landowners of those sections. Some of the cotton plants have frozen, but, on the whole, the work is progressing so favourably that the inspector is sanguine of the results.

Egyptian long staple cotton is being planted, and is found to resist the cold much better than other varieties commonly grown in the United States, and at the same time it furnishes a fine quality of cotton with a long fibre.

Another feature that is encouraging to growers is that the value of the cotton seed is now equal to, or greater than, that of the cotton. In cases where the fibre proves of small value, the seed will often make the crop profitable.

SESAMUM IN QUEENSLAND.

Sesamum is practically only of commercial value in its seed, from which oil is extracted variously known as Gingelly or Gingilie, Til or Teel, and Beniseed oil; the latter name, however, must not cause any confusion with the Indian oil of Ben, which is quite another thing. Sesamum is a well-known oil and crop in India and adjacent tropical countries. The oil is of high value on account of the many uses to which it may be put, for not only is it palatable and an illuminant but far more valuable as a machinery lubricant than most vegetable oils.

The plant grows very readily in Queensland and F. M. Bailey quotes it as a naturalised plant in the "Queensland Flora" (Vol. IV., p. 1,139). Other Queensland references are: "Queensland Agricultural Journal," Vol. III., p. 423, article *re* culture, referring to its experimental culture at the Queensland Agricultural College, Gatton, but mostly quoting the Indian (Bengal) experiences of the plant; "Queensland Agricultural Journal," Vol. XXVI., p. 141, *re* culture, &c., quoting Professor Olsson-Seffer's experience of it in Mexico; and Bernays's "Cultural Industries," p. 89, quoting the experience of it in many countries, but dealing with its value medicinally and as oil rather more than its culture.

Sesamum has been under cultivation experimentally at the Kamerunga State Nursery for several years. The plant has been found to attain a height of 2½ to 4 ft., and bear heavily. The formation of pods or capsules, which are from ¾ in. to 1¼ in. in length and about ½ in. in thickness, commences before the growth has ceased. The pinkish blossoms, not unlike the foxglove in appearance, open several at a time each day for a considerable period. The plants were found to be fairly straight growing, branching to some extent but certainly not becoming bushy, as will be seen in the illustration. The capsules contain a quantity of small seed slightly smaller than linseed, and appear to remain green and closed for a long time after attaining maturity, if not actually as long as the plant shows any signs of growth. Very hot sunshine will sometimes cause the earlier produced capsules to open; and once opened very little wind or shaking will dislodge the seed, though but little trouble has been experienced with "shattering" in this crop under ordinary circumstances.

Varieties.—There are three common varieties, most readily distinguished by the colours of the seed which are a pale yellowish-white, called the white; a brownish-red, called the red; and a brownish-black, known as the black.

Mr. Mollison states that the white variety matures the earliest in India, and also shows by the analyses by Dr. Leather quoted by him that this variety has the largest oil content. L. A. Bernays states that the black kind is reported to mature sooner than the others, but he does not state where. Professor Olssen-Seffer implies that the black is the more favoured in Mexico in quoting it as yielding nearly 45 per cent. of oil, though the average is a little below 40 per cent. No records can be found indicating any differences in yield, and it appears to be generally admitted that there is no difference in the quality of oil obtained from the different-coloured seed. Though being very similar these three varieties seem to maintain their characteristics and seldom hybridise.

Unfortunately only the black variety is to be found at the Kamerunga State Nursery, and the point as to whether it is the best of the three for Queensland cannot be determined by comparison. It may be noted that, according to Dr. Leather, the black has the highest content of nitrogen.

Soils.—The quality of the soils in which Til is grown in India are generally not very good. The black cotton soils mentioned are not to be compared in richness with the volcanic chocolate soils of Queensland. The Mexican soils are not described but are evidently good. In North Queensland, Sesamum has not been tried in heavy clayey soils, but will thrive in sandy loam, and the statement that it will thrive and bear well in an indifferent or poor soil—*i.e.*, one which has been regularly and well cropped and not manured—is fully corroborated.

Sowing.—In North Queensland there are two seasons in which Sesamum may be grown with success. The early season, in February to April; and again later in the year, August to September. Of these seasons the August-September one is the most satisfactory. The ground requires good tilth and a fine and firm seed-bed. It is best to drill the seed. The seed is small, and 4 to 5 lb. should be sufficient per acre for drills 2½ to 3 ft. apart. The Indian method of mixing several times its volume of dry sand or some such material (disintegrated oilcake is sometimes used) is appropriate and advisable if machine seed-drills are used. One inch in depth has been found ample, and deeper planting disadvantageous. The plants were found to grow fairly straight and not branch much; hence the Mexican method of planting in hills 5 ft. apart would not be suitable. Indeed the Mexican variety of Sesamum must be exceedingly bushy if it covers the ground at this distance. Counting out, even approximately, three seeds to a hill of such small seed would be quite out of the question under our labour conditions.

Growth and Pests.—Here the last planting was on the 30th of August, and the crop was harvested (a little late on account of the season) during the first week in January. The time maturing therefore—*i.e.*, from sowing of the seed to harvesting—averaged some 129 days, or, roughly, four and a-quarter months.

The Indian records give 115 to 151 days according to variety, and the greater time for the black. In Mexico sowings in May are harvested during the latter part of September or early in October; and in India it may be sown in September and harvested in January. These concur in finding the time of growth to be four to five months. Bernays alludes to it as being a three-month crop in Bengal, but this is doubtful.

For Queensland, as stated earlier, the August planting is the best, when the plants are ready to harvest in December and before the setting in of the monsoonal rain. February-April sowings are harvestable from May to July.

Sesamum has proved itself hardy in this country, not only in regard to germination and growth in indifferent soil but also in the matter of resistance to pests and diseases. Though nematodes were known to exist in the locality of the experiments none were observed on the roots of this plant. During growth the plants—that is, both leaves and seed capsules—were remarkably free from the attacks of grasshoppers, beetles, seed-boring grubs, and forms, &c.

Harvesting.—As also stated earlier, if no great changes of weather are experienced Sesamum as a field crop lends itself well to harvesting by machinery and at the one time. As the plant ripens the leaves turn somewhat yellow and sometimes some fall off, but it is not advisable to wait for complete maturity in the field for fear of loss of seed by shattering. The whole plant should be cut, therefore, before the capsules turn colour and while the last few at the tips are still somewhat immature. These few will be found generally to dry without opening, but even should they open and involve a small percentage of immature and light

seed in the bulk it is better than losing a far greater percentage of mature seed by leaving the crop too long in the field. If the weather is dry at harvesting there is no need to stook the plants, and they may be simply laid in a heap on a close-floored barn or tarpaulin and left for a few days, when, as they dry, the capsules will open of themselves and the plants (or straw) need but a light shaking for all the seed to fall out. But little winnowing will be found necessary if the plants have been cut at the right time, as the capsules as well as the leaves adhere to the stems, but if left in the field too long broken portions of dried leaves, &c., will be found among the seed. Often passing the seed through a fine sieve is sufficient to separate these, but if the seed is put through a winnower only the fine sieves must be used and the fan only turned gently, on account of the lightness of the Sesamum seed.

In harvesting, the Indian methods are more generally applicable to our conditions than the Mexican. In the Mexican article (" Queesland Agricultural Journal," Vol. XXVI., p. 142) allusion is made to the harvesting of the " beans," stating that in the opinion of some the " fruit" should be picked before quite ripe, and finally that " common sense shows that the proper time to pick the bean is when it is well coloured and perfectly ripe." Any *picking of the beans,* if it means individual picking of the small capsules of the Sesamum, is quite out of the question for this country. Further, it is stated that in Palestine the seed is stored for some time until it has undergone a sort of fermentation which facilitates the extraction of oil. While this may be advantageous and possible in the drier climate of Palestine it would be dangerous in North Queensland, for fear of mouldiness setting in that would affect the quality of the oil. The seed here, as soon as dry, had best be bagged and despatched or stored in a dry place pending treatment or sale.

Returns.—The returns obtained from the Queensland (Kamerunga State Nursery) experiments were at the rate of 982 lb. per acre of dry oil-seed. This is a good return. The Indian returns, as given in the extracts at the beginning of this article, vary from 320 to 454 lb. per acre. The African figures are 392 lb. per acre. Bernays gives no figures of return per acre, but the Mexican article quotes 50 *bushels* per acre. A bushel of Black Sesamum seed was found to weigh 50 to 51 lb. here, and the Mexican would probably not be less. At this rate, 50 bushels would represent at least 2,500 lb., or over 22 cwt. per acre, which seems an abnormal crop. Had the return been given as 50 *arroba* per acre—the measure used earlier in the same article and equal to 25 lb.—or the area been a hectare (equal to 2 acres 1 rood 35 perches), the return of half a ton more or less would seem more within the realm of possibility under the " favourable circumstances" mentioned. This gives 1,250 lb. in the one case and about 1,000 lb. in the other per acre. A crop as heavy as 22 cwt. per acre can, I am afraid, hardly be counted on in this country, even in our good soil, except under more than ordinarily favourable circumstances, if then.

Market.—I am not aware of any market at present in this State, as none of this seed has as yet, to my knowledge, been offered for sale in any commercial quantity. If the oil content is good, however, and we may anticipate 40 per cent., though perhaps not the 46 to 48 per cent. of the Indian seed, there is no doubt that the soapmakers and oil-seed treating firms would readily purchase it.

With many such oil-producing seed the trouble has been that, the seed being light, the freight of the raw material to the Southern cities where crushing plants exist absorbed an undue proportion of its value. With this seed, however, its weight at 50 lb. per bushel, would give some

fifteen 3-bushel bags to a ton, which would cost 20s. in freight from, say, Cairns to Brisbane.

The oilcake, after crushing, is a valuable stock and cattle food, as well as a highly nitrogenous manure.

Value.—For the same reason—viz., that I am not aware of any sales of this seed as yet in this country—no local value or prices can be given. Bernays mentions £25 to £48 per ton in England for the seed, but this is as far back as 1883. The Indian prices are £9 6s. 8d. per ton of seed, and £3 14s. 8d. per ton of oilcake, but all grains in India, on account of the cheap labour, are of somewhat lower market value than in other countries.

The prices given by Professor Olssen-Seffer in the Mexican article are probably the most recent and about the most correct and useful. These work out at £11 4s. per ton for seed, and £37 6s. 8d. per ton of oil.

Value per Acre.—At these rates, therefore, the returns in North Queensland, as shown by the Kamerunga experiments, are worth £4 18s. for the seed per acre; and if the outturn was 40 per cent. by weight of oil its value would be £6 10s. or so per acre, with a residue of oilcake at, say, £2 6s. 8d. per ton, worth some 12s. 3d. more. Cost of bags and bagging of such a crop would amount to about 4s., transport and freight to about 10s., and allowing, say, the odd 4s. for sundry charges, £4 per acre is left for production and profit.

This is not a great return; but, since Sesamum will grow well in indifferent soils, it would pay with white labour in, say, old sugar or banana land that could be readily ploughed and harrowed on a fairly large scale, with the seed sown by horse-power seed-drills and the crop reaped by machinery.

It would, however, obviously pay better if the seed could be crushed on the spot, when it will be seen that the return per acre would amount to some £7 2s. 3d. It would scarcely pay to erect a large plant to crush Sesamum grown on a small scale, though a small hydraulic oil-press could be obtained for £40 or so and would serve equally for crushing other oil-seeds such as pea or ground nuts. On a larger scale this staple would appear to be worthy the consideration of co-operative mills or companies as a fallow or rotation crop, or as a suitable crop for poor lands that have been under the plough but would otherwise be abandoned to more or less noxious weeds. As a crop it is quick in returns, under favourable circumstances two crops in the year being possible, and is inexpensive to deal with.

To sugar-mills which have the power and machinery, and who could at little cost install a hydraulic oil-press, and work it during the off-season, the cultivation of this staple, as well as other similar oil-producing annuals, should appeal, both as an auxiliary product for their farmers, on account of the value of the oil for use in the mill and local sale (about 50 per cent. of the oil expressed would cover all costs if sold), and for the oilcake as stock food and especially as a highly nitrogenous yet cheap manure for any cereal crop.

DISTANCE APART FOR COCOANUT TREES.

Cocoanut planters hold different opinions as to the distance apart at which cocoanuts should be planted in order to secure the best results. Some argue for wide planting; others for closer planting. In view of this divergence of opinion, His Excellency Sir William MacGregor requested Mr. T. A. Williams, of Sabai Island, Torres Strait, to furnish him with some information on the subject of the diameter of space to

which root cords spread out from the base of cocoanut trees. His Excellency has courteously handed to us Mr. Williams's reply, with permission to make it known through the medium of the "Agricultural Journal." From measurements made by Mr. Williams, it was found that one cord stretched 50 ft. from the base of the tree. This tree was, however, planted at the edge of high-water mark, the root cords extending along at right angles in soft, sandy loam. The majority of trees have a network of cords locking and interlocking each other, and stretching 30 ft. from the base of the tree. That, to the sides of the tree, would give a diameter of 60 ft. According to many South Sea planters, cocoanut trees should not be planted closer to each other than 40 ft.

Sir William pointed out that these root cords are elastic, and that the bole of the tree works in a species of cup, so that in a heavy gale, or even in a hurricane, the elastic roots are not broken when the tree is forced over almost to a horizontal position, and after the blow the elastic roots bring it once more to the perpendicular. The objection to close planting is that the root cords of one tree cross the root plants of its neighbour, and both root systems are injured owing to the constant chafing they are subjected to during high winds.

As in all tree culture, whatever injures the roots also exercises an injurious influence on the growth of the tree, the branch development, and consequently on the fruit.

His Excellency is now awaiting data concerning the relation of the root system to the branch development. The results, when obtained, will be published in the journal.

RUBBER SUPPLIES AND DEMAND.

Slowly but surely people are beginning to appreciate the fact that by January next we shall be face to face with a shortage of rubber. The 1911 world production of all sorts of raw rubber will not exceed 85,000 tons; the consumption cannot fall far short of 100,000 tons. If, however, we materially reduce the United States' consumption for the remainder of the year, taking 40,000 tons instead of 45,000 tons as the figure, and again reduce the European consumption estimates by a like amount, we would still be statistically 5,000 tons short on the year. This shortage the reclaimed and reformed rubber houses might manage to make good. Instead of being called upon to face supplies in actual excess of demand at the end of this year, we shall have, at the most modest of all computations, and making allowances for rubber supplies of all sorts, consumption in excess of supply, and, what is more, very much less prospect than some folk imagine at the present time of the 1912 figures differing to any very great extent from those of 1911, even allowing for the 15,000 tons increase promised by the Agricultural Department of Malaya.—"Rubber World," 10th August.

BRAZIL IN THE RUBBER MARKET.

We understand from our own sources of information that the floating supply of rubber in Brazil has been greatly reduced by private purchases, and it is probable that the maximum amount now awaiting delivery is 6,000 tons. This is about half the figure estimated a couple of months ago. If this process of absorption can be continued for a little while longer, it is evident that the general position of the rubber-producing industry will be very much better than at any time during the past twelve months.—"Stock Exchange Gazette," 15th June.

HINTS TO PROSPECTIVE SUGAR-CANE GROWERS.

BY A. J. GIBSON, Ph.D., M.A., General Superintendent, Bureau of Sugar Experiment Stations.

For the purpose of instructing intending farmers and others who have just commenced cane growing, it is intended to issue a number of short articles relating to the subject. Technical terms will be avoided as much as possible.

CHOICE OF LOCALITY.

In the choice of locality or district, it is necessary to take into consideration the nature of the plant to be grown. It must be borne in mind that the cane plant is indigenous to tropical climes, and the best results are obtained under such climatic influences. The cane plant is sensitive to cold weather, and two or three nights of severe frost can do much injury and damage, resulting in some seasons in great loss to the producer. There are canes which resist frost better than others, but there is no sugar-cane of commercial value which is absolutely frost-proof.

The rainfall is another essential factor, and is a widely varying one in Queensland. The coastal tropical cane-growing localities, with one exception, are most favoured in this respect. In the case of the one exception, a suitable supply of water is to be had at shallow depths, for irrigation purposes.

After making the necessary inquiries concerning the above subjects, the intending farmer goes further into details respecting the merits of the different suitable cane-growing districts, and finds out what lands are available. These consist of virgin lands (scrub or forest), as well as farms containing improvements, all of which may be either purchased or leased, &c. The matter of available funds enters mainly into the decision arrived at.

CANE LANDS.

Those lands best adapted for cane-growing purposes are classified as scrub and forest lands. The scrub lands are usually considered the better, on account of their great depth and richness. The alluvial scrub flats are particularly rich, and give large yields of cane. The scrub lands vary considerably in colour and texture, and have carried dense growths for a number of years, the leaves and decayed vegetable matter largely enriching the soil in organic matter.

The forest lands most suitable for cane-growing are chiefly of an alluvial character, and their fitness is generally recognised from the class of timber which they carry. Flats carrying Bloodwood, Moreton Bay Ash, and Acacia are generally considered good cane lands. Other forest lands are classed as second class, whilst a number of them are considered totally unsuitable. As a general rule, the forest soils are of no great depth, and the rainfall and climatic conditions of a district are the leading factors in determining their usefulness for cane-growing. It is also very important to have a knowledge of the character of the land—whether broken, flat, undulating, or gentle slopes. Steep hillsides and swamps are to be avoided. Lands which cannot be held permanently under cultivation are not to be recommended for cane-growing. It is well to convert them into paddocks for stock purposes.

PROXIMITY TO TRAMWAY, RAILWAY, AND FACTORY.

It is very essential that the cane lands shall be within a reasonable distance of a sugar-mill, in order to avoid heavy freight charges on cane. It is also a good thing to be near to a tramway or railway, thus overcoming difficulties in connection with haulage of cane by dray or wagon. It

requires a large outlay of capital to secure a good team of horses at the present time, and the risks are great, especially when working amongst land upon which there are large numbers of stumps. The cane-grower who starts farming under such circumstances is somewhat handicapped against the man whose farm is within easy access of tram or railway.

PREPARATION OF LAND FOR CANE-GROWING.

Having decided to take up an area with standing scrub on it, the next step is to thoroughly explore before felling the timber. Small tracks should be cut in all directions so as to get some idea of the nature of the land and the timber upon it. All marketable timbers should be removed and disposed of, if possible. It is well to locate the future position of the homestead, taking into consideration elevation, drainage, &c., without utilising the best agricultural land for such purposes.

Before felling takes place, scrub-brushing is undertaken. This operation consists of knocking down the smaller undergrowth and cutting all vines, which are likely to interfere with the subsequent tree-felling. This is usually commenced immediately after the wet season is over, so that the burning off, clearing, and cane-planting are completed before the wet season again sets in. Care should be exercised in felling the timber to get it into heaps as much as possible. The branches should be properly lopped and well arranged to give the fire every chance of making good progress. The best possible conditions should be chosen when burning off—firstly, to see that brushing and felling has been properly done, the timber and leaves dry, and the wind in the proper quarter.

After burning, the timber remaining upon the ground is usually heaped up and burned. If a good fire results, the lumping is light; on the other hand, a poor fire means a good deal of extra work and expense. Much of this can be avoided if the necessary care is exercised as above described. Too frequently, a mistake is made by the settler attempting too much clearing at the one time. It is advisable to clear small areas at a time, and more especially so if labour is not available for the work.

CANE-HOLING.

This is done as soon as possible after burning off. The rows are marked off at distances of 5 ft. apart, and the cane holes placed from 12 to 18 in. apart in the rows. The implements used for cane-holeing are of various types. On steep hillsides an implement consisting of a piece of 1½-in. piping drawn out to a sharp point at the end is sometimes used. The same is driven into the ground at an angle of 45 degrees, the plant then being placed in the hole. This method is very rarely used otherwise, and is not recommended. The mattock and spade are chiefly used for the operation, the former tool being most in favour on account of being more suitable than the spade for cutting roots.

The holes are made long enough to hold a plant cut into short lengths and containing three eyes, the width being that of the mattock blade, and the depth from 6 to 8 in.

The sets are then placed in the holes and covered lightly with soil. The main duty after the plant comes through the ground is to keep the land free from weeds. If the season is a good one, not much chipping is required, and the first plant crop should mature in from 14 to 18 months.

THE C^ 'TON INDUSTRY IN QUEENSLAND.

Slowly but surely the areas under cotton are increasing. In former days there was no need to inculcate the advantages and profits to be derived by farmers in this State by the cultivation of this universally used textile. They found, by experience, that there was more money in

a cotton crop than in maize or potatoes, and that the labour and cost of production of cotton were infinitely less than in the case of the two crops mentioned.

It may be asked: "If cotton-growing was such a paying business, why was it eventually abandoned?" To this it may be replied that after the Civil War in America labour in the United States was so plentiful and cheap that cotton was thrown upon the British market in immense quantities and at such a low price that it became impossible to compete with it from distant lands, even where cotton was produced by cheap coloured labour; transport by land, freights, and other expenses amounting to more than the cotton would realise on arrival in England.

Since those days conditions have materially altered. Better seed has been introduced, resulting in increased productivity and a higher class of cotton. The cost of cultivation, notwithstanding high wages, has been much reduced. Land carriage has been simplified and cheapened by the construction of railways in the agricultural districts. Competition in shipping circles has greatly reduced freights. The establishment of an immense number of cotton-spinning mills and oil factories in the United States has necessitated the retention of tens of thousands of bales of cotton which formerly found its way to Europe. Cotton is even being bought by United States spinners from Egypt to the extent of £2,000,000 per annum. "Give us cotton" is the general cry from British spinners. Prices consequently are high, and the once despised cotton seed is now of greater value than the cotton itself. Thus everything tends to success if the industry is carried on properly.

There is one great inducement to enter upon cotton-growing; and that is, the establishment of a cotton-spinning mill by Messrs. Joyce Bros. at Ipswich, where many kinds of cotton goods are manufactured, particularly from the variety of cotton grown in North Queensland, known as "Caravonica." Large quantities of this splendid variety of long-staple are produced on Gossypium Park, an extensive plantation near Cairns, owned by a company whose general manager, Mr. J. Campbell, has struck out a novel line, and one calculated to show what can be done by well-directed enterprise.

The idea of placing Caravonica prominently before the Queensland public was taken up by Messrs. Pike Bros., the well-known outfitters in Queen street, who, in furtherance of their enterprise, have secured the sole agency for the Caravonica product. Having thus secured the raw product, they caused it to be manufactured into a great variety of Caravonica cotton underwear. These goods, in the shape of men's under vests and pants, are exhibited in one of the firm's windows, in which also there is what may be called a patriotic and industrial display, showing cotton in all its stages—from the growing plant laden with ripe, bursting bolls of fleecy white cotton to the finished cotton garments mentioned. The spun hosiery yarn is manufactured by Messrs. Joyce Bros. at their cotton mills at East Ipswich, where hundreds of hands are employed doing everything in their power to encourage and promote the cotton industry in Queensland.

The question now naturally arises: "Seeing what a variety of excellent cotton goods can be manufactured and sold at reasonable prices in our own State, why is it necessary to send the raw product to England, only to have it shipped out again in the form of manufactured goods, to the prime cost of which are added all sorts of charges, freights, commissions, insurances both on the outward and return voyage, when all this could be saved, or, at any event, a considerable proportion of it, by growing the cotton here and manufacturing it on the spot?"

Chemistry.

NITROGEN FROM THE AIR—NITROLIM.

In April, 1910, we published a short article on "Cyanamide as a Fertiliser," in which it was pointed out that calcium cyanamide is a cheap, concentrated nitrogenous manure—a recognised substitute for nitrate of soda and sulphate of ammonia. This substitute, under the name of "Nitrolim," will, under normal conditions, it is claimed by the manufacturers, produce on all classes of soil (with the possible exception of sour, swamp land) a considerable increase in crops, comparing more favourably with results obtained from the use of other and far more expensive nitrogenous manures. The active fertilising constituent of Nitrolim being nitrogen—guaranteed analysis 18 per cent. nitrogen, equal to 22 per cent. ammonia—as is the case with nitrate of soda and sulphate of ammonia, a good supply of phosphate of lime and potash applied by suitable artificial fertilisers, such as kainit and superphosphate, is necessary with each crop.

In order to ensure the best results from Nitrolim, a few simple but important rules must be observed in its application. To begin with, it should be mixed with at least twice its weight of fine soil and applied 10 to 14 days before sowing or planting, and the mixture should be spread over the land as uniformly as possible. It should then be ploughed, harrowed, or dug in to a depth of 3 or 4 in., and, wherever practicable, immediately after spreading. It should not be spread in rainy or windy weather, and it is well to allow the mixture to stand 10 or 14 days, in order that it may give the best results as a top dressing. Generally speaking, it should not be used by itself as a top dressing, but only when mixed with phosphates and covered. After burying as explained, the fertiliser will gradually sink into the soil.

An excellent mixture for autumn and winter application is 3 to 4 cwt. of kainit mixed with 1 to 2 cwt. Nitrolim, thus supplying the necessary nitrogen and potash. In the spring 3 to 4 cwt. of superphosphate should be applied in soluble form, and thus a complete manuring will have been given. By mixing the Nitrolim with kainit, the moisture in the latter is absorbed, and any objection to the handling of Nitrolim by itself, owing to its dusty nature, is avoided. Similarly, by mixing Nitrolim with superphosphate, and sprinkling the heap with a little water while mixing, a very satisfactory compound is produced, pleasant to handle, and easy to spread by hand or by machine. Although by the chemical action set up, the water-soluble phosphates in the superphosphate are partly reverted, the phosphates, nevertheless, remain in an extremely soluble condition, and results are excellent. There is one point about Nitrolim which adds greatly to its value, and that is, that it contains a large percentage of lime, and, if applied regularly, it will, to a great extent, do away with the necessity for liming, and will keep the soil sweet.

When mixing the two fertilisers (Nitrolim and Superphosphate), they should be kept sprinkled with water to keep down the heating produced by the slaking of the quicklime in the Nitrolim.

For further particulars we refer the reader to the sole agents, Trackson Bros., Ltd., Electrical Engineers, Brisbane.

Science.

STEAM AND GAS, AND THEIR APPLICATION FOR POWER PRODUCTION.

HEAT.

It is now an accepted theory that heat is convertible into mechanical work, and work, conversely, into heat: "Heat and work are mutually convertible, the one into the other"; hence, 'Heat' is said to be simply a mode of motion or condition, and not a material substance, as was formerly supposed.

To prove that heat is not a material substance, we may put any given weight of cold water into a perfectly closed vessel and apply heat till the water becomes warm, either by radiation, conduction and connection; but, although the temperature of the water has changed and its volume increased, its weight remains the same, and if more heat be applied till all the water is converted into steam, the total weight of the steam is still exactly the same as that of the cold water from which it was produced, although the volume is increased it may be 1,200 to 1,700 times the original volume of the water. The actual increase of *volume* and the *pressure* developed in the vessel would be in exact ratio to the original relative proportional weight of water to the capacity of the vessel.

Theoretically, all matter is held to be composed of molecules which are not in a state of rest, but are moving or vibrating with an intensity corresponding to the physical status of the matter concerned. In solids such as the earth, and substances of a similar nature, the rate of vibration is very low; then it grows more rapid, step by step, upwards through the world of protoplasmic, vegetable, animal, and human life—still swifter in *light, colour,* the mind of man, and infinitely swifter in the spirit of creation.

It is this molecular vibration which is generally believed to cause heat, in degree relative to its velocity, and since a body in motion has kinetic energy, and since the molecules composing matter are assumed to be in motion, each molecule possesses kinetic energy; hence, we can conceive "Heat" to be a form of energy—*i.e.*, a condition of intense vibration. Motion, to produce heat, may result from mechanical action, as, for example, the friction of rubbing surfaces, or from chemcial affinity, as by the union of carbon or hydrogen in fuel, with the oxygen of the air, or from electric currents; and the more rapid the molecular vibration, the greater we can conceive will be their separation and expansion, and the more intense the heat involved.

Here let me point out the dissimilar conditions in the application of thermal or heat energy in the case of steam engines and internal combustion engines.

When a given volume of steam or gas, under pressure, impinges and expands against a receding piston, it does work upon it through the liberation of stored-up heat, and the resulting conversion of its latent energy into dynamic pressure.

A fundamental difference, however, exists between steam and gas in the method of delivery and of producing working pressure.

Steam, generated in a boiler, is conveyed and delivered to the engine under maximum pressure.

Gas is delivered to the engine at atmospheric pressure.

Thermal (or heat) energy has already been injected into the steam from the boiler furnace.

In gas the thermal (or heat) energy is latent up to the instant of ignition, which takes place only after a proper proportion of air is supplied to dilute the gas and form an explosive mixture.

WATER.

Water is a compound of two gases—*i.e.*, hydrogen and oxygen. Its most important properties to the engineer are that it easily assumes either of three forms—*i.e.*, solid, liquid, or gaseous.

It is principally in connection with refrigerating plants that the engineer has to deal with the solidification of water, and that is outside the scope of this paper.

As a liquid and as a gas, the use and control of water has occupied the inventive mind of man for ages, and been the means of calling into activity the most strenuous efforts of the greatest civil and mechanical engineers the world has known.

It is so common that, like air, it receives little notice except from the student of physics.

Meantime, we will notice it for its usefulness to the mechanical engineer, who, by converting it into steam in closed vessels (boilers), causes it to act as the vehicle for conveying and delivering heat to an engine, where the heat is converted into motion for useful work, and the exhausted steam allowed to escape to the atmosphere or to a condenser, where in either case it returns to its original liquid condition.

STEAM.

Steam is water vapour—*i.e.*, it is water changed from a liquid to a gaseous state by the application or, we might say, the injection of heat.

The conversion of water from the liquid to a gaseous state may be carried out in any close vessel by the heat from fire impinging against the outer surface of the vessel.

The heat from the fire is conducted through the shell of the vessel to the water, and the whole volume of water is heated by connection currents, the velocity of which is determined by the shape of the vessel, the area of heating surface, and the intensity of combustion.

The properties in steam which are of direct interest to the engineer are its efficiency as a vehicle for conveying heat, its expansibility, and its condensibility.

Steam may be delivered to engines in two widely differing conditions—*i.e.*, either *saturated* or *superheated.*

By saturated steam is meant steam in contact with the water from which it was generated.

It is then in a condition when temperature and pressure are mutually dependent. To thoroughly understand this, let me state as a proposition that "The boiling (or vapour-liberating point) of a liquid is determined by the equilibrium or balance existing between the liquid vapour tension and the pressure it supports"; or, in other words, the condition of opposing forces constantly existing in a steam-generating

vessel is created and maintained by the action of the heat injected into the liquid, tending to its expansion and ebullition; being opposed by the pressure of vapour accumulated between the internal surface of the vessel and the surface of the liquid. And since "Action and reaction are equal and opposite" it follows that the vapour tension developed in the liquid by the heat must be sufficient to overcome the resistance due to the pressure acting on the surface of the liquid.

If pure water is heated to 212 degrees Fahr. in a free atmosphere—*i.e.*, in an open vessel—it boils and vapourises freely, but if the same water be enclosed in a vessel where the pressure on its surface is, say, 400 lb. per square inch (absolute) the temperature necessary to cause vapourisation would be 445 degrees Fahr., and all intermediate temperatures and pressures have their specific ratios.

To show still more clearly the mutual dependence between temperature and pressure I should point out that, instead of the ordinary pressure-gauge fitted to steam boilers, it would be possible (but not convenient or advisable) to have a thermometer fitted to a boiler to indicate the internal temperature from which to determine the pressure in the boiler.

"Superheated Steam" is steam separated from water by heating in a separate vessel to a higher temperature than the boiling point corresponding to its pressure—*i.e.*, superheated steam has a higher temperature than saturated steam at the same pressure.

It is independent of pressure, since at any pressure steam may be superheated to any desired temperature.

A saving in steam of 12 to 15 per cent. is to be expected from a moderate superheat, but it must not be assumed that superheating may be carried on indefinitely with corresponding economy, as there are several important conditions limiting the practice in its application to steam engines.

Steam may be decomposed into its original elements (hydrogen and oxygen) by superheating to a high temperature; and this, I may remark, is what is done both in the process for making water gas—which is used principally in metallurgy—and producer gas, which is coming into extensive use for engines, and about which I shall have something to say later on.

Steam boilers are vessels in which the steam used for conveying heat to give motion to an engine is generated.

Their forms and structural details are numerous and varied, and their development from 200 B.C. to date would form both an interesting and instructive study for students.

The earliest type of a thoroughly useful and fairly economical steam boiler was a plain horizontal cylinder with spherical ends; then the "Cornish," with one fire flue; followed by the "Lancashire," with two fire flues; and the "Vertical," with circular section in horizontal plane; and locomotive and portable boilers, with numerous flue tubes of small area; and marine boilers of various flue tubular types. Then comes the water tube (which are sometimes termed "Sectional") boilers, which again are classed in two groups—*i.e.*, those in which the circulation is extremely active, as in the "Yarrow" and "Thornycroft" types, and those in which the circulation is more regular and normal, to which class belong the "Belleville" and "Babcock and Wilcox" types, nearly all of which will be illustrated and explained by diagrams on the screen.

Producer Gas Plant.—We have already noticed the different conditions in the application of thermal energy as between steam and internal combustion engines. We also noticed various types of closed vessels—*i.e.*, boilers used for concentrating heat by injecting it into water for conveyance and delivery to steam engine cylinders; and I shall now endeavour to explain, in a necessarily limited way, the production of gas fuel for internal combustion engines.

The use of hydrogen—*i.e*, town gas, was practised for a number of years before other means of supplying a different gas to internal combustion engines was recognised as practicable or likely to be economical.

Petroleum engines had already taken a place for comparatively small powers, but patent office records show that many inventors were engaged in trying to devise means for supplying a cheaper gas for use in developing large powers, and "Dynamic" gas-producing plants were the result.

The broad principles upon which all gas-producers work are that any combustible substance, when heated to a high temperature, either by the process of its own combustion or by the application of external heat, will be partially or wholly gasified.

The most familiar example of this process is to be seen in the ordinary household fireplace. The sudden blaze which so often results from stirring the fire is merely the burning of those gases which are rising constantly through the red-hot fuel, but which are prevented from burning when passing through the hot fuel because of the inferior supply of oxygen.

When, however, these gases mingle with the fresh air, passing above the surface of the fuel, the oxygen renders them combustible. If the fire be dull the heat at this point is insufficient to ignite the gases, much of the gaseous fuel then passes away unburnt, which, if collected in a reservoir, could be burnt at will by a further supply of oxygen.

As far as I am aware, the dynamic gas-producers introduced to Queensland have been of the types suitable for using anthracite, charcoal, or coke, or what are usually termed "non-bituminous" fuels, but great advances are being made in gas plant equipments (in England) for using bituminous fuels—coaldust, &c., some diagrams of which will be shown and explained on the screen, as will also steam and gas engines to much more advantage than can be in the absence of illustration.

VERY WILD RUBBER!

In the old cotton-growing days in Queensland, we have extracted old boots, pumpkins, stones, and on one occasion half a riding saddle from bags of cotton we confidingly purchased without examining the contents; but the following story of a swindle has not yet been equalled in this State:—

Many things have been found in crude rubber balls, but we fancy the experience of the machine-minder in the Midland Company's factory is unique. He was putting some Peruvian ball through the machine when a series of explosions took place, and he found himself bombarded by bullets. When the consignment of rubber was examined, it was found to contain a number of live cartridges—a novel sort of make-weight. Happily no great harm was done, but this form of Peruvian rubber atrocity is one to which the "Daily News" might devote some attention.—"Rubber World."

General Notes.

DRIED MUSHROOMS.

Mushrooms are very plentiful at certain seasons in Queensland, particularly in cattle paddocks, but they are shortlived, and the season is not a prolonged one. The "Rural New Yorker" tells us how mushrooms may be preserved for future use:—In studying foreign cook books one continually meets with such directions as, "Now add one dozen mushrooms." This formerly jolted my zeal for imitating French cookery, since canned mushrooms are expensive and far below the fresh article in flavour. At last I learned from no less an authority than Mrs. Rorer that they may be dried so as to be available for use at any time. The following is Mrs. Rorer's recipe:—To prepare dried mushrooms, wipe clean and peel off the skin. Cover the bottom of shallow tins with white paper and stand the mushrooms on this to dry in a cool oven. When dry and shrivelled, take them out and put them in paper bags in a cool, dry place. When wanted, put them into cold water or milk and bring slowly to a simmer. In this way they will regain nearly their full size and flavour.

CRYSTALLISED BANANAS.

The following method of preparing crystallised bananas at San Domingo is given in an American Consular Report:—

Peel the bananas, which must be fully ripe; then cut the fruit in slices, or in thin sections, about ¼ in. thick. Cover these with fine sugar, and expose to the sun on small boards or wooden platters. Turn the slices over as often as is needful, and at each turning, powder them again with sugar. In a very few days, the sections are sufficiently dried. and form a crystallised conserve of exquisite flavour.

THE PULLING FORCE OF A TRACTION ENGINE.

A correspondent of the "Farmer and Settler," Sydney, writes to that journal as follows concerning the meaning of horse power as applied to an engine:—

Just a word about "That horse power query" in a recent issue. I read your previous answer, also Mr. Stanley's. So far, it seems to me, you are both considerably out in your comparison of the pulling power of an 8-h.p. traction engine and eight draught horses. I own several 8-h.p. tractions, and I venture to say that with one engine I will take on to pull the best fifty draught horses ever collared. To give your inquirer some idea of the pulling power of an 8-h.p. traction engine, I will endeavour to briefly describe the same:—

An 8-h.p. traction engine is equal to 33 actual h.p. Since the steam engines introduced by Watt were employed to a large extent in substitution for work formerly done by horses, he found it necessary to be able to give his customers some idea of their capabilities, or, in other words, to state how many horses his engine would relieve. From experiments it was found that an average horse was capable of exerting a power equivalent to 22,000 foot pounds of work per minute. Watt determined to give thorough good value in engine power, so he decided to give 50 per cent.

more power than the power of the average horse, thus adding an extra 11,000 to the 22,000, which made 33,000 foot pounds. Therefore every horse power developed by the engines would be capable of exerting that amount of work. Your inquirer will no doubt see what a poor chance eight horses would have against an 8-h.p. traction.

[On the whole, we think our correspondent is not far wrong in stating that an 8-h.p. traction engine will pull many more than eight draught horses. An 8-h.p. traction engine will draw as much as 30 tons on a level road, whereas eight horses will not draw much more than perhaps 10 or 12 tons. As stated by Mr. Brown, the theoretical power of an average horse is about 22,000 foot pounds, whilst mechanical horse power is about 50 per cent. more. In any case, in a prolonged contest the horse can never hope to win, as his strength is constantly giving out, whilst the engine's vitality is being renewed every moment through the furnace and the boiler.—Ed. "Farmer and Settler."]

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

Table Showing the Total Rainfall for each Month of the Year in the Agricultural Districts of Queensland.

Stations.	1910.					1911.							
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.
North.													
Bowen	0·18	3·75	0·30	3·89	5·36	23·72	7·57	10·66	1·64	0·12	0·2	Nil	0·15
Cairns	3·59	1·34	1·67	7·27	11·59	34·49	27·43	35·35	52·31	2·08	1·44	1·48	0·27
Geraldton (Innisfail) ...	7·42	11·51	3·18	7·30	4·77	36·96	35·51	28·39	50·53	3·58	5·10	6·20	0·79
Gindie State Farm ...	Nil	...	...	..	3·87	11·69	4·15	2·29	0·29	0·29	Nil	Nil	0·49
Herberton	0·83	0·58	0·43	4·93	9·71	11·43	13·16	15·35	14·17	0·58	0·36	0·40	0·5
Hughenden	Nil	2·75	1·57	3·41	1·13	9·15	3·76	0·17	6·29	0·4	0·2	0·2	Nil
Kamerunga State Nurs.	3·39	...	2·06	...	...	...	23·08	...	52·28	151·0	...	...	...
Mackay	0·48	4·32	0·7	2·67	2·15	30·52	13·01	14·41	3·14	0·77	0·22	0·43	0·18
Mossman	1·91	2·90	3·17	10 36	19 91	32·76	21·95	71·64	37·10	1·44	0·33	1·28	...
Rockhampton	0·23	1·62	0·99	4·17	2·46	9·64	21·07	6·39	1·44	0·56	Nil	0·24	1·17
Townsville	0·3	3·34	0·11	2·53	6·77	25·40	19·24	4·24	3·02	0·7	0·11	Nil	Nil
South.													
Biggenden State Farm	0·28	...	2·36	4·59	5·96	10·37	7·34	6·25	...	...	...	...	...
Brisbane	...	2·72	3·27	2·49	13·99	10·30	5·84	4·69	0·88	0·90	0·9	1·70	2·22
Bundaberg	0·16	2·33	0·70	8·39	1·58	21·05	9·75	4·31	1·46	0·56	Nil	0·37	1·15
Crohamhurst	0·70	2·30	3·83	3·31	6·20	28·85	19·20	16·67	2·94	1·21	0·13	3·58	2·62
Dalby	0·64	2·11	3·96	4·09	3·29	8·08	2·24	3·20	0·76	0·91	Nil	0·68	0·43
Esk	0·23	4·65	3·41	3·84	7·53	11·90	6·04	3·54	0·99	1·90	Nil	...	1·51
Gatton Agric. College	0·60	...	3·60	2·85	6·84	12·03	3·98	2·80	1·38	0·58	Nil	0·72	0·90
Gympie	0·32	1·54	2·90	3·16	1·96	9·13	5·33	6·02	1·88	0·32	Nil	0·97	0·48
Ipswich	0·58	1·55	3·70	1·96	5·04	8·15	4·19	2·51	1·38	0·42	Nil	0·59	1·12
Maryborough	0·35	1·22	1·53	4·19	3·19	16·93	6·58	7·20	2·61	0·16	0·11	0·62	1·47
Roma	Ni	0·46	3·64	4·39	0·96	11·52	5·94	1·25	0·14	1·13	Nil	0·67	1·55
Roma State Farm ...	...	0·38	2·95	3·50	7·97	9·72	...	5·39	0·04	·02	...	...	1·39
Tewantin ...	1·34	1·52	3·17	7·71	8·25	20·84	8·50	18·11	1·78	0·57	0·22	2·53	1·07
Warren State Farm ...	...	...	0·45	...	...	...	11·75	3·17	...	...	Nil	0·6	1·01
Warwick ..	0·54	1·39	2·20	3·86	3·46	7·13	2·01	3·12	0·74	1·04	Nil	1·20	1·50
" Hermitage State Farm	0·39	...	...	...	...	...	...	...	...	...	...	...	...
Westbrook State Farm	...	...	2·98	..	4·44	5·26	3·90	1·76	5·50	0·79	0·1	1·1	0·54
Yandina	0·15	0·88	3·34	5·16	16·05	12·04	10·73	12·02	2·68	0·28	Nil	2·43	Nil

Note.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

Answers to Correspondents.

WASHING MILK STRAINERS.

"Dairywoman," Mullet Creek, Gladstone—

Your letter has been submitted to Mr. Graham, Dairy Expert to this Department, and he advises as follows:—

> "*Washing of Milk Strainers.*—Rinse in lukewarm water. Then thoroughly cleanse in hot water and soda. Next immerse strainer in boiling water. Afterwards swing the strainer rapidly in the air, and expel surplus moisture. Drain and dry in the sun. The heat occasioned by the immersion of the strainer in boiling water will be sufficient to thoroughly dry the vessel, and thus retard the tendency to rust. No drying cloth should be used on any dairy utensil."

DEHORNING CALVES.

"Dairy Farmer," Gladstone—

The growing practice of dehorning cattle has proved very beneficial to the cattle themselves as well as to the owner. We have frequently pointed out the severe injuries which horned cattle inflict upon each other, more especially when travelling in cattle trucks, by accident often as much as of set purpose. The dehorning of mature stock is rapidly performed by the perfect instruments used for the purpose, but how much simpler and how much less painful to the animal is the removal of budding horns from calves by a careful use of caustic potash.

The English Board of Agriculture gives the following directions for use of caustic potash:—Clip the hair from the top of the horn when the calf is from two to five days old, slightly moisten the end of the stick of caustic potash with water or moisten the top of the horn bud, and rub the tip of each horn firmly with the potash for about a quarter of a minute or until a slight impression has been made on the centre of the horn. The horns should be treated in this way from two to four times at intervals of five minutes. If, during the interval of five minutes after one or more applications, a little blood appears in the centre of the horn, it will then only be necessary to give another very slight rubbing with the potash.

The following directions should be carefully observed:—The operation is best performed when the calf is under five days old, and should not be attempted after the ninth day. Caustic potash can be obtained from any druggist in the form of a white stick; when not in use, it should be kept in a stoppered glass bottle in a dry place, as it rapidly deteriorates when exposed to the air. One man should hold the calf while an assistant uses the caustic. Roll a piece of tinfoil or brown paper around the end of the stick of potash, which is held by the fingers, so as not to injure the hand of the operator. Do not moisten the stick too much, or the caustic may spread to the skin around the horn and destroy the flesh. For the same reason keep the calf from getting wet for some days after the operation. Be careful to rub on the centre of the horn, and not around the side of it. Caustic potash is poisonous, and must, therefore, be kept in a safe place.

Calves that have been treated are from two to twenty months old, and no sign of a horny growth on one of them. It seems a pity that all calves that are to be dehorned cannot be done in this manner, as the operation is very simple and it saves the more serious and trying operation later, both to the animal and the operator, also the expensive instruments.

Bear in mind that the potash burns after you are through with the operation, and that some calves have thin skin and others thick, so that it takes a little experience to determine just when to stop the application of the potash, but it is by far the best way to dehorn.

PEABERRY.

"COFFEE," Nerang—

Peaberry is not a special variety of coffee. If one of the two seeds in a coffee berry is abortive, the other takes an oval round form, and such beans are known as "peaberry" coffee. Peaberries seldom occur in young, vigorous trees, but are popularly supposed to possess a superior flavour and to roast better, for which reasons, real or imaginary, they fetch, or used to fetch, a higher price in the market, although the difference is not so great as it used to be. Last March when the prices of coffee ranged from 63s. to 72s. per cwt., we noted that peaberry was quoted at from 74s. to 92s. per cwt.; in May the quotation was 61s. to 89s. 6d.; in June, 69s. 6d. to 85s., when other coffee brought from 62s. to 76s.

Times of Sunrise and Sunset at Brisbane, 1911.

DATE.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·4	5·33	5·29	5·47	4·59	6·5	4·46	6·28
2	6·3	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·2	5·34	5·27	5·48	4·57	6·6	4·46	6·29
4	6·0	5·35	5·26	5·49	4·57	6·7	4·46	6·30
5	5·59	5·35	5·25	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·24	5·49	4·55	6·8	4·46	6·31
7	5·57	5·36	5·23	5·50	4·54	6·9	4·46	6·32
8	5·56	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·55	5·37	5·21	5·51	4·53	6·11	4·46	6·33
10	5·54	5·38	5·20	5·52	4 53	6·11	4·47	6·34
11	5·53	5·38	5·19	5·52	4·52	6·12	4·47	6·35
12	5·52	5·38	5·18	5·53	4·51	6·13	4·47	6·35
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·51	6·14	4·47	6·37
15	5·48	5·40	5·14	5·54	4·50	6·15	4·48	6·37
16	5·47	5·40	5·13	5·55	4·50	6·16	4·48	6·38
17	5·46	5·41	5·12	5·55	4·49	6·17	4·48	6 39
18	5·45	5·41	5·11	5·56	4·49	6·18	4·49	6·39
19	5·44	5·12	5·10	5·57	4·48	6·18	4·49	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·50	6·40
21	5·41	5·42	5·8	5.58	4·48	6·20	4·50	6·41
22	5·40	5·43	5·7	5·58	4·47	6·21	4·51	6·41
23	5·39	5·43	5·6	5·59	4·47	6·22	4·51	6·42
24	5·38	5·44	5·6	6·0	4·47	6·22	4·52	6·42
25	5·36	5·44	5·5	6·0	4·47	6·23	4·52	6·13
26	5·35	5·45	5·4	6·1	4·46	6·24	4·53	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·14
28	5·33	5·46	5·2	6·2	4·46	6·25	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6·26	4·54	6·44
30	5·31	5·47	5·0	6·4	1·46	6·27	4·55	6·45
31	...	...	5·0	6·4	...	...	4·56	6·45

PHASES OF THE MOON.

		H.	M.
1 Sept.	☾ First Quarter	2	21 a.m.
9 „	○ Full Moon	1	57 „
16 „	☽ Last Quarter	3	51 „
22 „	● New Moon	0	37 „
30 „	☾ First Quarter	9	8 p.m.
8 Oct.	○ Full Moon	2	11 p.m.
15 „	☽ Last Quarter	9	46 a.m.
22 „	● New Moon	2	9 p.m.
30 „	☾ First Quarter	4	41 „
7 Nov.	○ Full Moon	1	48 a.m.
13 „	☽ Last Quarter	5	19 p.m.
21 „	● New Moon	6	49 a.m.
29 „	☾ First Quarter	11	42 „
6 Dec.	○ Full Moon	0	52 p.m.
13 „	☽ Last Quarter	3	46 a.m.
21 „	● New Moon	1	40 „
29 „	☾ First Quarter	4	47 „

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	SEPTEMBER. Prices.
Apples (Eating), per case	9s. 6d. to 11s.
Apples (Cooking), per case	6s. to 8s. 6d.
Bananas (Cavendish), per dozen	3d. to 4d.
Bananas (Sugar), per dozen	$2\frac{1}{2}$d. to 3d.
Cape Gooseberries, per case	4s. 6d. to 7s. 6d.
Custard Apples, per quarter-case	3s. 9d. to 5s. 6d.
Citrons, per cwt.	11s.
Lemons, per case	3s. to 3s. 6d.
Mandarins, per case	4s. to 8s. 6d.
Oranges, per case	3s. 5d. to 6s.
Papaw Apples, per quarter-case	1s. to 1s. 6d.
Pears, per case	...
Peanuts, per lb.	3d. to $3\frac{1}{2}$d.
Pineapples (Ripley), per dozen	2s. to 5s. 3d.
Pineapples (Rough), per dozen	9d. to 2s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s. 9d.
Strawberries, per doz. boxes	4s. to 5s. 6d.
Tomatoes, per quarter-case	3s. to 7s.

SOUTHERN FRUIT MARKET.

Apples (Tasmanian), per case	6s. 8d. to 12s.
Apples (Cooking), per case	4s. to 6s. 6d.
Apricots, per gin case	...
Bananas (Queensland)—	
Cavendish, per case	8s. to 12s.
Sugar, per case	8s. to 12s.
Ladies' Fingers	8s. to 12s.
Bananas (Fiji), G.M., per case	16s. to 17s. 6d.
Bananas (Fiji), G.M., per bunch	4s. to 10s.
Cocoanuts, per dozen	2s. 6d. to 3s.
Custard Apples, per tray	8s. to 11s.
Grapes, per half-case	...
Lemons (local), per gin case	2s. to 3s. 6d.
Mandarins (local Emperors), per gin case	2s. 6d. to 6s. 6d.
Mandarins (Queensland), per case	...
Oranges (local), per gin case—	
Sevilles, per gin case	2s. 6d. to 3s. 6d.
Navels, per gin case	6s. to 12s.
Other, per gin case	4s. to 6s.
Passion Fruit (Choice), per half-case	8s. to 9s.
Papaw Apples, per half-case	4s. to 5s.
Peaches, per half-case	...
Peanuts, per lb.	$5\frac{1}{2}$d.
Pears (Victoria), per bushel case	4s. 6d. to 8s. 6d.
Pineapples (Queensland), common, per case	6s. to 7s.
Pineapples (Queensland), Ripley's, per case	6s. to 7s.
Pineapples (Queensland), Queen's, per case	6s. to 7s.
Strawberries, (Queensland), per 3-quart tray	3s. 6d. to 5s.
Tomatoes (Queensland), per bushel case	2s. 6d. to 5s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR SEPTEMBER.

Article.		SEPTEMBER. Prices.
Bacon, Pineapple	lb.	7½d. to 9d.
Barley, Malting	bush.	2s. 6d.
Bran	ton	£6 10s.
Butter, Factory	lb.	11d. to 1s.
Chaff, Mixed	ton	£3 5s. to £4 10s.
Chaff, Oaten (Victorian)	,,	£5 15s.
Chaff, Lucerne	,,	£4 to £7 10s.
Chaff, Wheaten	,,	£3 to £3 10s.
Cheese	lb.	7d.
Flour	ton	£9 5s.
Hay, Oaten (Victorian)	,,	£6 15s.
Hay, Lucerne	,,	£4 7s. 9d.
Honey	lb.	2d. to 2¾d.
Maize	bush.	3s. 4d. to 3s. 7d.
Oats	bush.	3s. 3d. to 3s. 6d.
Pollard	ton	£6 10s.
Potatoes	,,	£6 to £13 10s.
Potatoes, Sweet	cwt.	3s.
Pumpkins	ton	£3
Wheat, Milling	bush.	3s. 8d,
Onions	ton	£5 to £6.
Hams	lb.	1s. 1½d.
Eggs	doz.	7½d. to 1s.
Fowls	pair	3s. 6d. to 4s. 3d.
Geese	,,	5s. 9d. to 6s.
Ducks, English	,,	4s.
Ducks, Muscovy	,,	4s. to 5s.
Turkeys (Hens)	,,	8s.
Turkeys (Gobblers)	,,	12s. to 14s.

TOP PRICES, ENOGGERA YARDS, AUGUST, 1911.

Animal.	AUGUST. Prices.
Bullocks	£8 17s. 6d. to £11 5s.
Cows	£7 15s. to £8 15s.
Merino Wethers	22s. 6d.
Crossbred Wethers	26s. 9d.
Merino Ewes	19s. 3d.
Crossbred Ewes	22s. 6d.
Lambs	18s. 9d.
Pigs (Porkers)	34s. 6d.

EXHIBITION.

Animal.	AUGUST. Prices.
Bullocks	£15s. 10s.
,, (Champion)	£20
,, (Guessing)	£23 10s.
Cows	£9 5s.
,, (Champion)	£10 15s.
Merino Wethers	22s.
C.B. ,,	34s.
Merino Ewes	12s. 6d.
C.B. ,,	25s.
Lambs	20s.

PRICES OF FARM PRODUCE FOR AUGUST.

LONDON QUOTATIONS.

Article.	AUGUST. Price.
Cotton (Uplands), per lb.	6·32d. to 7d.
Cotton (Sea Island), per lb.	12d. to 20d.
Cotton Seed, per ton	£6 to £8
Rubber (Pará), per lb.	4s. 1d. to 5s. 8½d.
Rubber (Ceylon, Smoked), per lb.	4s. 10½d. to 5s. 9d.
Copra (S.S.), per ton	£23 15s.
Copra (Ceylon), per ton	£25 5s.
Copra (Malabar), per ton	£26 10s.
Hemp (Manila), per ton	£21 7s. 6d.
Hemp (Sisal), per ton	£21 to £21 10s.
Hemp (Mauritius), per ton	£25 to £28
Ramie, per ton	£40 to £48
Soja Bean Oil, per cwt.	31s.
Soja Beans, per ton	£7 5s. to £7 10s.
Coffee (Costa Rica), per cwt.	65s. to 82s. 6d.
Coffee (Fair Greenish), per cwt.	71s. 6d. to 100s. 6d.
Coffee (Low Middling), per cwt.	67s. to 69s.
Coffee (Bold Fair), per cwt.	66s. to 80s. 6d.
Coffee (Liberian), per cwt.	65s.

OSTRICH FEATHERS.

The principal brokers engaged in the ostrich feather business in London are—

Messrs. Levis and Peat, 6 Mincing lane, London, E.C. Messrs. S. Piggin and Co., 44 Fenchurch street, London, E.C. Messrs. Hole and Son, 10 Fenchurch avenue, London, E.C. Messrs. Delton and Young, 38 Fenchurch street, London, E.C.

Besides these, there are about a score of feather merchants in London who import and handle ostrich feathers.

For the month of March, 1911, it may be stated that 105,500 lb. of feathers were sold, the prices ruling being as follows:—

White primes and blood feathers, £60 per lb. A few lots very fine, sold at £66 and £82 10s.

White-tipped (very fine), £30 to £38 10s. per lb. (One lot superior, £54).

Femina, light good to fine firsts, £27 10s. per lb.

Femina, thirds, £10 10s. per lb.

Bycocks, long (superior white, £17 10s. to £25), £15 10s. per lb.

Black, long good to fine, £7 10s. per lb.

Black, medium and short, common and pickings, 10s. per lb.

Drab, long good to fine, £7 10s. per lb.

Drab, medium and short, common and pickings, 2s. per lb.

Floss, medium black and drab, £2 2s. 6d. per lb. (Good large, 55s. to 57s. 6d.).

Floss, medium and short black and drab, 10s. per lb.

Spadones, white and light, £7 per lb.

Spadones, femina and drab, 11s. per lb.

Boos, white inferior to good, £5 15s. per lb.

Boos, femina and drab, £1 per lb.

The next auction sales will be held on 9th October and 4th December. Sales are held in London about six times a year. The above information was supplied to the Department of Agriculture and Stock by the Agent-General for Queensland, Sir Thomas B. Robinson.

Farm and Garden Notes for November.

Field.—Under ordinarily favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, &c. Plant sweet potatoes, sisal hemp, yams, pea-nuts, and ginger.

Kitchen Garden.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the towns with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c.; and transplant for succession in calm cloudy weather.

Flower Garden.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

Orchard Notes for November.

THE SOUTHERN COAST DISTRICTS.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those grown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop, valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended to; cyaniding can be carried out where necessary, and is especially useful now in the case of the Red, Purple, Mussel, Circular Black, and Glover Scales. Fruit fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-clusters should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of the pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oïdium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will be ripe. In any case do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

TROPICAL COAST DISTRICTS.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Papaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only a single layer of fruit, and should be sent in the cool chamber. I am certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of year, when their winter fruits are off and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; far too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be systematically fought, and the orchard should be kept in a good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening soil.

SOUTHERN AND CENTRAL TABLELANDS.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if fruit fly makes its appearance, it is systematically fought.

Look out for Codling Moth, and continue the sprayings with Kedzie's mixture.

Look out carefully for any San José scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed and little damage is done either to the tree or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San José Scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oïdium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oïdium or Black Spot. Look out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit fly in the early ripening fruits, and gather and destroy all that may be so affected.

Agriculture.

FARM BOOKKEEPING.

Last month we gave instructions for a simple method of keeping farm accounts. The following shows a

FULLER METHOD.

A complete and much more exhaustive set of accounts may be kept without a large amount of labour by means of a cash book, a ledger, and a labour book. The cash book serves for the record of receipts and payments. Accounts are opened in the ledger for the various crops, kinds of stock, and classes of expenses of which it is desired to keep separate account, in order that the approximate profit or loss resulting from each may be known.

The number and character of these accounts will vary according to the class of farming carried on, and each farmer must decide for himself what accounts to open. Each account is debited with the value of that particular class of stock in hand, or, in the case of crops, with the cost of cultivations, seeds sown, &c. The cost of labour must be divided up amongst the various items. All receipts appearing in the cash book are carried to the credit of their proper ledger accounts and the payments to their debit. At the end of the year a valuation must be made, and the value of stock in hand, or sold but payment not yet received, and of cultivations, is placed to the credit of the accounts, and that of purchases not yet paid for to their debit. The balance, gross profit, or loss, is transferred to profit and loss account.

Except on farms where there are numerous credit sales, it is unnecessary to open accounts in the ledger for each person or firm with whom business is done. The large number of personal accounts which appear in many published examples of farm bookkeeping form one of the main causes of the apparent complication of the systems advocated. Where the credit dealings are few, the records in diary or notebook are sufficient for them. When the credit dealings are numerous it is necessary to enter them in a day book and to transfer them to personal accounts in the ledger, preferably a ledger kept specially for them.

Profit or Loss on Various Departments.

Accounts kept on the system above described will enable a farmer to ascertain, with at any rate approximate accuracy, the profitableness or otherwise of the various departments of his business. Manufacturers who produce a variety of wares keep cost books, in which each class of stock produced is debited with—

1. Cost of all materials used.
2. Wages paid to workmen.
3. A proper proportion for rent, supervision, interest on capital and profit.

By this means the manufacturer learns the exact cost of his wares—a knowledge which is essential to him if he is to conduct his business successfully. Knowledge of the exact cost of producing the things he sells is just as useful and necessary to a farmer, and can be obtained by him in a similar manner, though it is difficult to secure absolute accuracy

because of the influence which the various items have upon each other. For example, the action of some purchased manures, as well as of dung, extends over several years, and benefits many crops, and it is difficult to fix the amount which should be charged to the crops of a particular year; while in the case of foods the total cost cannot be charged to the stock which consume them, for crops benefit from their manurial residues. This is the main difficulty which arises in farm bookkeeping, but it is one which can be overcome with a little care.

In order to ascertain as nearly as possible the return from each of the separate branches of farming—*e.g.*, from fat stock, dairy cattle, arable land, &c.—it is necessary to keep records showing:—

1. Distribution of feeding-stuffs, whether concentrated or bulky, purchased, or home-grown, so as to know the amounts consumed by the different classes of stock and thus be able to charge the cost against the proper ledger account.
2. Stocking of pastures and use of grass keep.
3. Distribution of seeds and manures.
4. Employment of labour, both horse and manual, and the wages paid in such a form that the expenditure on behalf of the various accounts is shown. This daily record must state the employment of each labourer, or the account on behalf of which he has been engaged.

The following is a form which has been found effective for this purpose. It is based on one recommended many years ago in Morton's "Cyclopedia of Agriculture":—

Wages.	Nature of Employment.							Amount of Wages Chargeable to					
	Name of Labourer.	S.	M.	T.	W.	Th.	F.	Corn Crops. (1.)	Roots. (2.)	Clover. (3.)	Dairy. (4.)	Cattle. (5.)	Sheep. (6.)
s.								s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
18	Jones	5	1	2	1	2	2	6 0	9 0	...	...	3 0	...
18	Smith	6	5	1	1	3	1	9 0	...	3 0	...	3 0	3 0
18	Brown	5	4	3	5	2	6	...	3 0	3 0	3 0	6 0	3 0

When and How to Commence Farm Accounts.

The correct time for a farmer to commence his farm accounts is when he enters upon the business of farming. All is then straightforward as regards opening the books. He begins with a certain amount of cash, which he enters as a receipt in his cash book, and his payments for live and dead stock, cultivations, &c., are duly entered and posted to their proper ledger accounts as these are opened. For one already in business the best time to commence systematic bookkeeping is the usual date at which farm tenancies commence in the district. In this case the first step is a valuation of everything connected with the business, and the entry of the values in their respective ledger accounts.

Valuation.

A valuation at the close of each year is essential if the accounts are to show the true financial position of the farmer, or the profit or loss on particular departments. It is of the utmost importance that as exact an estimate of the values as is possible be secured.

There is a difference of opinion, however, as to whether the ordinary live stock of the farm, such as horses, cows, and ewes, should be valued in accordance with the fluctuations of the market at the prices prevailing at the time, or whether they ought to be valued each year at the same price per head for stock of a similar class and age. The former method shows the value which would be realised if the stock were sold; but, even in a time of inflated prices, they cannot be disposed of, as they are required for carrying on the business. In such cases this method may show profits which are not actually secured, while in a period when low prices prevail it may indicate losses which are not really sustained. Valuation at a regular and medium price per head is on this account to be preferred. So long as the quality of the stock remains practically unchanged it gives more exactly the profit actually realised under the circumstances, while it has the advantage of being less troublesome. This does not, however, apply to "flying" stock, such as cattle and sheep brought in for fattening. These must be valued at market prices, otherwise no correct estimate of the profit from fattening stock can be obtained.

In the same way the whole of the machinery and implements need not be valued individually each year. If, say, from 10 to 15 per cent. of the value of these, according to whether there is little or much expensive machinery which decreases rapidly in value, is written off each year as depreciation, the result will in most cases not be far wrong. Care must be taken to add the cost of new implements purchased during the year. A valuation in detail may be made after an interval of a few years, to check the correctness of the allowance. It is desirable, however, that the allowance should be ample rather than otherwise.

The figure in the "nature of employment" columns refers to the item in the next series of columns, and shows the account to which the man's wages are chargeable. These latter columns will be identical with those for which it has been decided to open ledger accounts, and the total amount of each wages column in this labour book should be added up monthly and transferred to the ledger, which will then show the sum expended in wages in respect of each account.

The same book may be used to record the number of horses employed in respect of the various accounts, but no charge should be made for them until the end of the year. The net cost of maintaining the horses should then be ascertained, and this sum divided among the accounts in proportion to the work done for each.

With the exception of the labour book, these records do not necessitate frequent entries. The form in which they are kept will depend upon the division of the accounts. For example, if the live-stock accounts comprise only one for cattle, one for sheep, and one for pigs, the record for feeding-stuffs and grazing will be fairly simple. If, however, each of these is divided, as is desirable, into breeding stock, store stock, and fattening stock, the record becomes more complicated and troublesome to keep. Similarly, with seeds and manures, if only one account is kept for arable land, the record is little trouble, but this is much increased if an account is opened for each kind of crop grown.

By means of these records the expenditure on feeding-stuffs can be distributed amongst the live-stock accounts; that on manures and seeds amongst the arable and the meadow land accounts; wages and cost of horse labour amongst all the accounts on behalf of which work has been done; rent, rates, taxes, and insurance amongst both live stock and crop accounts, and so on with the various expenses.

In the case of stock being transferred from one account to another—say, from store to breeding or fattening stock—an adjustment is made, the

account from which they come being credited and the other debited. A similar adjustment is necessary for the manurial value of foods consumed. the crop account which benefits being debited and the live-stock account credited.

The extent to which such transfers and adjustments are made will depend on the character of the farm and the produce dealt in, but the principle is the same throughout, the object aimed at being to charge each separate branch of the business for which an account is kept with the whole of the direct and indirect expenses which it involves or from which it benefits, and to credit it with its due proportion of the receipts, in order to ascertain the real profit or loss on that particular branch.

STACK ENSILAGE.

The advantages of stack over silos for the small farmer who cannot afford the cost of a silo, are obvious. To begin with, the outlay is considerably less. No capital is needed to be sunk in the erection of a costly building, and in these days of high wages and increased cost of material, this is a weighty consideration. Another point is, that much cartage is saved, because a silo is a fixture in the farmyard, and all the fodder must be carted to it from the field. The cartage of greenstuff is no light matter, especially at times when competent field labour is almost unobtainable. But in the case of the stack, the cartage is reduced to a minimum because the stack is placed in a corner of the field where the crop is grown. Then, again, a silo must either be filled or the unfilled part represents so much money wasted on building. But the stack may be of any size, and a separate stack may be made for each crop on a different part of the farm. There are two kinds of silage—sweet and sour. The former has a rather agreeable smell; the latter has, on first opening a silo, a somewhat offensive smell, which, however, soon passes off. In a silo, sour silage is made by ramming and compressing the material as rapidly as possible, keeping the temperature down to 50 deg. F., if possible. The silo must be filled and covered in one day. The only acid present will be lactic, with a little butyric.

Another method is to tread and compress the material as usual, keeping the temperature below 120 deg. F. The filling may extend over a week. The acid in this silage will be both lactic and butyric. Sweet silage is made by carting the green fodder straight to the silo, then treading it well in at the sides, but not in the middle, the temperature to be between 140 deg. and 150 deg. F. This should produce a fruity type of sweet silage.

However, we are, for the present, concerned only with stack ensilage. The first thing for the farmer to do, when deciding to make an ensilage stack, is to get a rough idea of the probable amount of green fodder with which he has to deal. He knows, or ought to know by experience, that a crop which will make 1½ tons of hay to the acre will make from 5 to 6 tons of silage to the acre. To be on the safe side, he will do well to take the higher figure. Supposing, therefore, that he has 10 acres, he would reckon that where he could make 1½ tons of hay, he would make a stack of 60 tons of silage. Now as to the number of stacks. Generally speaking, the larger the stack the better; and this is obvious, since the proportion of exposed surface is less. But if he decides on more than one stack, in order to save cartage, the area of the base of the stack will be: For 15 tons, 10 ft. by 9 ft.; for 35 tons, 13 ft. by 12 ft.; for 75 tons, 16 ft. by 15 ft.; and for 100 tons, 17 ft. by 17 ft.

The stack must, of course, stand on a wooden framework of stout logs, to which, if pressure is applied by winches, the drums are attached. The framework is then covered with any rough material, such as old slabs or fence rails, when it is ready for the reception of the fodder. The making of good silage depends very much on cutting the crop at the right time. It should, by no means, be allowed to get overripe, but should be cut in its full succulence; maize, for instance, should be cut when the cob is in the milk stage; lucerne, cereals, and legumes when just in the early flowering stage. The fresher the crop is when stacked, the better, therefore it should be carted and stacked as it is cut, with the greatest possible despatch. Once the stack is started, it should be continued and finished as expeditiously as possible, regardless of weather. If there is a choice, it is not advisable to start making silage in very wet weather; but, once the start is made, the state of the weather must not interfere with the work, and there should be no intermission until the stack is completed and pressed or weighted.

The stack should be built quite perpendicular at the sides and ends, and props should be placed against the sides to counteract any tendency to heel over.

After each day's stacking, the sides and ends should be raked down, the top left flat, except just in the middle, where a little of the fodder is heaped up, to allow the ropes to bite, if tackle is used to press the stack.

The secret of successful silage-making is summed up in one word—temperature. Hence, the thermometer must be used throughout the process of building. The temperature at which the best silage is made ranges from 130 to 150 deg. F. There is seldom any difficulty in obtaining sufficient heat, the risk lies in overheating, and this is most likely to occur at the top of the stack, from the fact that the heat ascends from the lower layers. It is, therefore, a good plan, when practicable, to put a day's stacking of the wetted and most succulent portion of the crop on top.

The ideal to aim at is silage which is not only sweet but green and succulent. When the silage is brown and dark, it shows that the temperature has been allowed to rise above 150 deg. F. For some purposes, especially for feeding horses, the brown silage is preferable. This may be secured by allowing the temperature to rise to not more than 160 deg. F. Above that temperature, however, the stack should, under no circumstances, be permitted to rise, or the silage will be overheated and burnt.

When completed, the stack, if tackle is not used, should be covered with boards or slabs, and loaded with stones or bags of gravel, sand, &c. Such weighting is far preferable to ropes hove down by winches, for as the stack sinks the weight sinks with it, so that the pressure is always the same.

For regulating the temperature, an ordinary floating dairy thermometer is the most convenient type to use, an iron pipe, of slightly larger diameter, being built into the stack in a vertical position. The thermometer may then be lowered to any required depth and the temperature taken.

ON CULTIVATION.

How often has it been impressed upon farmers, that without constant cultivation the best results cannot be expected from farm crops? And yet there are farmers, so-called, who take very little trouble with after cultivation, once they have ploughed, harrowed, and put in their crop. As pointed out by Mr. Primrose McConnell in the following excellent paper

on the subject, which appeared in the September issue of the "Journal of the Department of Agriculture" of New Zealand:—

"It may be safely said there is no art (for it is an art) of such vital importance to the world at large as the art of cultivation. Nevertheless, it must be admitted that, in a literal sense, there is no art under the sun which has made such slow progress. As a matter of fact, all the best rules in practice to-day were known and followed ages ago. Cato, who lived before the Christian era, was well versed in what we vaingloriously term 'up-to-date' modes of cultivation, including draining, thorough stirring of the soil, liming, and even knew the benefit accruing from the growth of a leguminous crop, such as beans. Pliny and many others were also exponents of the art of cultivation.

"At the present day there is much talk of 'agricultural science,' 'research,' &c., while the practical rules, the carrying out of which are essential to success, are more or less neglected. Science is good, but when it gets ahead of practice it leads to confusion. Moreover, science can never be applied with such exactness to many of the branches of agriculture as it can be to other arts or professions. We expect too much of science, and it will be well if we are not disappointed. When I make such a statement I am speaking of cultivation in its simplest sense. In many ways science has done great things for agriculture, more particularly in the matter of plant-breeding, or selection; also in the control of animal and vegetable diseases and parasites; but in other directions success can only be attained by unceasing practical experiments and careful observation.

"Thorough cultivation simply means the creating of an environment that will enable both vegetable and animal life to reach the highest point of perfection. Before any successful attempt can be made in cultivating the soil the latter must be in a sufficiently dry state. Fortunately, a considerable portion of the earth's surface is naturally dry. By 'dry' soil I mean soil where the water-table does not come close to the surface. Wet soil is valueless, from a farmer's standpoint, and no attempt should be made to cultivate it until it is thoroughly drained. Wet soil is disastrous alike to vegetable and domesticated animal life. On the other hand, it makes the best of breeding-grounds for the internal parasites which cause such havoc among our live stock.

The agricultural implement maker has done a great work by the introduction of labour-saving implements, and it would be impossible at the present day to carry on the work of cultivation without the aid of such implements; but, again, it must be admitted no implement can do such effectual work as the primitive spade.

"The most valuable of all farm implements is undoubtedly the plough, and the more often this implement is used previous to the sowing of any farm crop the greater will be the chance of success. As to the depth of the furrow, the farmer must be guided by the depth of the surface soil and the nature of the subsoil; also by the nature of both the previous and the coming crop. As a boy I was taught that it was a good practice (and I believe the rule still holds good) to plough as deeply as the land will permit once in the course of a four-years rotation, the depth varying from 6 in. to 12 in. When only the former depth can be attained, on account of the nature of the subsoil, the subsoil plough may be used to very great advantage, more particularly on very retentive soils.

"Although the success accruing from deep, thorough, and repeated cultivation has been known for ages, it is only of late years that scientists have arrived at the reason why. They now inform us that this thorough cultivation is necessary because it stimulates certain low forms of life in the soil by the admission of sun and air, these forms of life responding by

changing plant-foods in the soil into such a condition that they may be easily assimilated by the plant.

"Many years before soil bacteria were thought of, Jethro Tull laid down the axiom 'Thorough cultivation is half manuring,' and this axiom has not been, nor ever will be ruled out by any findings of science, although in the light of present-day science the wording may be altered to 'Thorough cultivation enables the farmer to reap the benefit of all plant-food that may be in the soil, while indifferent cultivation has little effect in this direction.' The most successful farmers I have known were in the habit of ploughing their land thoroughly four or five times before sowing a root or potato crop, and by repeated experiment it has been proved that the more frequently land is ploughed the greater will be the net profit on the corp. It is true that we in New Zealand cannot go to the extent of ploughing five times, but in preparing for a root or potato crop land should never be ploughed less than twice, and afterwards thoroughly, deeply, and repeatedly worked with the cultivator. Repeated cultivation has also the effect of destroying weeds, and the destruction of the latter is a work which the New Zealand farmer must face in earnest at an early date.

"It must be admitted that the farmer of this country has much to contend against in the form of scarcity and dearness of labour, but it must also be admitted that a portion of the land has now got into such a state through indifferent cultivation that if some better system is not adopted in the near future it must go out of cultivation entirely. Perhaps there are no better exponents of the necessity of thorough cultivation than the much reviled Celestials who supply us with market-garden produce. Theirs is mostly spade work, it is true, but it none the less shows the advantage arising from thorough and repeated cultivation.

"It is also a fact that efficient cultivation checks, to some extent, the ravages of vegetable parasites. Wherever possible, the land should be ploughed as soon as a crop is removed, for the oftener it is cultivated, and the longer it is exposed to the sun and air before another crop is sown the greater will be the chance of success.

"It is true that drought or other weather extremes may, to some extent, upset our best calculations. On the other hand, deep and thorough cultivation is the best means of storing a reserve of moisture in the soil and by surface cultivation while the crop is growing we conserve the moisture that has been stored. Deep cultivation also enables the soil to rid itself of much of the surface water that may be the result of a wet season, so that whether the season be wet or dry, good cultivation lessens the risk of complete disaster.

"The best plough now on the market is the 'digger.' If this plough is of the proper make, and properly set, it will do as much in one operation in the way of cultivation as the ordinary plough will do in two. If the skimmer is properly adjusted it is also a great weed-eradicator, as the top sod is turned into the bottom of the furrow and the weeds effectually smothered—that is, the majority of weeds, for some cannot be killed by this operation. In dealing with weedy land—that is, in instances where the weeds have not been securely buried—the disc harrow should be avoided, especially in the case of sorrel. It would be better to use the cultivator and tine harrow, so that all weeds may be dragged to the surface.

"As a means of cheap and effective cultivation the motor will undoubtedly take first place in the near future.

"Manuring is, of course, included in cultivation, but it is too wide a subject to be dealt with here.

"Among the principal rules of cultivation there are two that every farmer should lay to heart. These are: First, thorough cultivation; second, more cultivation; and I might add a third, which would be, 'still more cultivation.' It must be borne in mind, however, that thorough tilling of the soil will not of itself maintain soil-fertility. As a matter of fact, it is a powerful means of depleting the soil of its fertility. If land contains considerable stores of dormant humus, the repeated stirring of the soil hastens the decay of humus and sets free a considerable quantity of plant-food. If the soil is indifferently cultivated the manures a farmer may apply, or which are lying in an inert state in the soil, may be likened to badly invested money for which the farmer receives no interest while the capital itself is being more or less wasted.

"The great object of the farmer should be to maintain a *permanent*, not a temporary, system, of agriculture, or one in which the available plant-food shall not only be maintained but increased; and this can only be accomplished by judicious manuring and thorough cultivation. The present deplorable state of much of the cultivated land in the United States of America should be sufficient warning to us in New Zealand. A system of indifferent cultivation, and soil-robbery, has been followed for ages, with the result that hundreds of farms are now deserted, the owners flocking over the border into Canada, where, no doubt, they will for a time carry out much the same system. The present average wheat-yield of the United States is 13½ bushels per acre, while in England it is 31 bushels. The latter result is not due to the fact that the lands are more fertile, but almost entirely to better methods of cultivation, thereby maintaining the fertility of the soil."

POTATOES AND JERUSALEM ARTICHOKES FOR PIGS.

In his valuable work on "Pigs and their Management," Mr. H. W. Potts, Principal of the Hawkesbury College and Experiment Farm, Richmond, New South Wales, gives a chapter on "Crops for Pigs." Amongst the roots and tubers he considers Jerusalem artichokes as a most valuable food. Why this crop has been so much neglected by Queensland pig-breeders is hard to understand, seeing that its cultivation is simple and the yield of tubers considerable.

Concerning roots and tubers generally as pig-food, Mr. Potts says that —"All these, when fed continuously and exclusively to pigs, have a lowering tendency on the digestive functions, but that this is a matter which, in intelligent hands, can be controlled. The value and importance, he says, of root crops for pigs, particularly in our warm climate, are now widely recognised, in so far as they are used only as a succulent and relishable adjunct to other classes of food, richer in protein, and containing less moisture. A normal nutritive ratio must be maintained, and the success of feeding largely depends on the right interpretation of the balanced ration. We find that many root crops form excellent aids to the standard feeds.

"Amongst the domestic animals, none respond so readily to root crops as pigs. We have to admit that, under some conditions of climate, they are costly crops to raise, as they require large quantities of water. All things being equal, however, they provide a high percentage of digestible dry matter. Their value is chiefly emphasised in making available, during the hot, dry months of summer, and the cold months of winter, a succulent, relishable fodder, when our natural pastures and herbage are dry and scarce.

"Seeing they contain high percentages of water, starches, and sugars, it is essential, in the maintenance of a maximum growth in fattening swine, that they be combined judiciously with cereals, maize, flesh food, lucerne, pollard, skim milk, cowpeas, peas, beans, and other similar foods.

"A too wide nutritive value may create waste and check good growth, by preventing the complete digestion of the protein, as well as permitting some of the starches to pass from the body as manure." On the subject of

POTATOES

as pig food, the author says: "When fed to pigs, potatoes appear to agree with them better than other root crops, particularly when the ration is balanced with barley, maize, or oats and skim milk. The Danes secure very high returns with this class of food. The starchy matter of the potatoes is combined with the protein of the skim milk and cereals to formulate a well-arranged diet. The bacon made from pigs fed on these rations has a notable reputation.

"At the Wisconsin Experiment Station it was ascertained that 1 bushel of maize is equal in food value to 4½ bushels of cooked potatoes. In numerous experiments it was found that pigs always secured better flesh gains by being fed on cooked potatoes in comparison with those given raw.

"The use of potatoes as pig-feed can only be determined by the current market values. When potatoes are low in price, their use as a pig-food is justified; but, where potatoes are grown as a staple crop on the farm, there is always an unmarketable residue, and these can be fed to pigs with advantage. Pork raised solely from potatoes has a tendency to be very fat, and wasteful in cooking. In every instance they must be fed with other foods in which the percentage of protein is prominently high."

ARTICHOKES.

"This is a flowering, perennial plant which has, in the past, been overlooked as a valuable food for pigs. It grows from 6 to 9 feet high, and when in bloom, seen from a distance, the crop looks like one of miniature sunflowers.

"The stalks are frequently used for feeding sheep or conversion into silage, and the tubers afford a palatable and succulent food for pigs. The plant is very persistent in growth, and, if raised in suitable soil, is difficult to eradicate. Enough tubers, as a rule, are left each year to continue the crop; hence it is wise to set apart a permanent paddock for it, or the odd corners of a farm, or waste places of little value for other crops, may be used for growing artichokes.

"The plant is extremely hardy; it resists frost and drought. Whilst the best crops are raised on good mellow loam, profitable yields are secured on stiff clay lands, light sandy or gravelly soils. The land is best suited where the drainage is good; in fact, any soil suitable for potatoes will answer for artichokes. It is a crop that requires little attention when it is established.

"The soil needs thorough cultivation. It should be deeply ploughed about May or June. During the winter it may be harrowed occasionally, lightly reploughed about September, and well manured as if for sweet potatoes. The tubers are then planted by dropping them into furrows 3 ft. apart, with a space of 2 ft. between the tubers. If the sets are small, plant whole, while large ones may be cut. Cover by turning a furrow over them. About 4 cwt. of tubers will plant an acre.

"The crop matures in five months. Should rain fall immediately after planting, the harrow may be run over the land to fine the surface. This should be repeated when the plants are about 4 in. high. It checks evaporation, destroys weeds, and will not injure the crop. Later on, the cultivator should be kept moving between the rows about once a month.

"When the crop flowers and the tops droop and die, about April or May, it is ready for harvesting. The average yield will be from 7 to 8 tons per acre."

"Two varieties were tested at Hawkesbury College, and gave the following results:—

Jerusalem White .. .. 9 tons 1 cwt. per acre.
Jerusalem Pink .. .. 6 tons 16 cwt. per acre.

"For feeding pigs it is best to turn them into the crop, to root out the tubers. It must be remembered that, where it is desired to continue the crop, the pigs should re removed before all the tubers are eaten.

"Few foods are more relished by pigs. The tuber in the raw state is very nutritious, more especially for pregnant sows, and also sows reduced in weight and condition after suckling and weaning big litters.

"This class of food acts as a diuretic, or promotes a healthy action of the kidneys in secreting urine; it relieves constipation and stimulates liver function. One acre will support twenty sows from four to six months. Young growing pigs evidence considerable growth on being fed with them for a short period. The exercise obtained in harvesting or rooting up the tubers has a beneficial influence. It is especially notable that artichokes are very digestible.

"The outcome of a number of tests goes to show that, for fattening purposes, these tubers must be given with grain, and have a similar result to feeding with ordinary potatoes; 325 lb. of wheat fed with 820 lb. of artichokes gave 100 lb. increase. The average composition of the artichokes is shown here in contrast with the potato":—

—	Water.	Ash.	Protein.	Corbo-hydrates.	Fat.	Nutritive Value.
Artichoke	79·5	1·0	2·5	16·7	0·2	1:7
Potato	78·9	1·0	2·1	17·9	0·1	1:8·6

PRODUCTION OF MAIZE.

As frequently pointed out in these notes, the production of maize may be profitably extended in this State. The last statistics available—those for the season 1909-1910—show that New South Wales produced in that season 7,098,255 bushels of maize; Queensland, 2,508,761; Victoria, 1,158,031; South Australia, 3,361; and Western Australia, 2,240 bushels. Although New South Wales produced more than twice that of all the other States in the Commonwealth put together this State had yet to import 332,239 bushels of maize from the other States.

The season for planting maize has again come round, and a few facts concerning the production of this cereal may be, at this juncture, useful to farmers. Two factors in successful maize-growing stand out prominently at all times—namely, the use of the best seed and the conservation of moisture in the soil by cultivation, preparatory to the planting of the crop.

COST OF PRODUCING MAIZE.

Farmers who grow maize somewhat extensively in some districts infer that it does not pay as well as it should. The Department's inspector in the South Coast districts (Mr. Makin) has something to say in the matter. During the last three years, he says, that he has been watching the cultivation of maize on the South Coast with interest, and learning much from the experiments carried out by the Department in the different localities.

Being under the impression that there was only small monetary returns from maize grown under the system adopted on the coast, Mr. Makin consulted some of the leading maize-growers as to the cost of production. It was found that, while each grower admitted that more money should be made from maize-growing, the farmer could not clearly define the reason why.

In calculating the cost of production with some of the best authorities in the different maize districts on the South Coast, for estimates for labour and rent of land averaged as follows, the yield in two cases being 60 bushels, and in two others 50 bushels per acre:—

	Per Acre. £	s.	d.
Ploughing and harrowing	1	3	0
Planting	0	3	0
Seed	0	1	1
Scuffling	0	10	3
Pulling, husking, and carting	1	5	10
Shelling	0	7	9
Bags	0	7	6
Rent of land	1	15	0
Tax on land	0	1	11
	£5	15	4

The average yield of 60 bushels per acre for Bega district and 50 bushels for Shoalhaven would yield a profit of from £1 14s. 8d. to £3 4s. 8d. per acre. The cost of production would be, therefore, at the rate of 1s. 11d. per bushel for the 60-bushel crop, and about 2s. 3d. per bushel for the 50-bushel crop.

HOW COST OF PRODUCTION IS INCREASED.

In referring to the general methods employed in maize-growing in these districts, Mr. Makin says that he found that most farmers harrow twice after ploughing; and the estimates given him showed that the cost was from £1 10s. to £1 per acre. In all cases single-furrow ploughs were used. Planting cost from 2s. to 5s. 6d. per acre; and the inspector was astonished to learn that some farmers yet plant by hand. The estimate for hand-planting is 5s. 6d. per acre.

The seed was valued at from 1s. 3d. to 1s. per peck. Only one estimate included artificial manure, and that was at 6s. per acre. Scuffling (one estimate included chipping) ranged from £1 to 4s. Pulling, husking, and carting ranged from £1 15s. to 18s. 6d. Bags were quoted at current rates—about 7s. 6d. per dozen.

Rent of land was from £1 10s. to £2 10s. This is an item, Mr. Makin contends, about which much may be said. Briefly, it is not fair to debit a crop with the whole of the rent, as two crops should come off the paddock;

but it was found in most cases that farmers do not adopt that practice. When the maize is pulled, cows are turned in to consume any feed that may be left, and later on the land is ploughed again for maize.

The figures quoted as to cost embrace the period only from the time the plough enters the ground until the maize is in the bag. A complete estimate should include the cost of cartage to the port or railway station, freight, wharfage, cartage again, and commission. All of these items mean added pence, so that with the cost of production as stated—namely, 2s. 3d. per bushel for a 50-bushel crop—there is not much of a balance to pay for the marketing, interest, insurance, and depreciation of horses and machinery, which should all be included in the cost of production.

PRODUCTION MUST BE CHEAPENED.

It is obvious, on a study of the foregoing items of cost, that the expense in producing a crop of maize under the conditions described is far too heavy. The cost should, and can, be reduced. It is debatable whether maize could not be marketed more economically " on the hoof." The feeding of stock with such highly nutritious material may well be considered in a comparison between the value produced by feeding the maize to poultry and pigs or other farm stock and marketing it as ordinary grain.

In the United States, where maize-growing is carried on more extensively than in any other country in the world, and under more varied conditions of soil and climate, the cost of production is between 7½d. to 1s. 3d. per bushel. Comparing this with the cost of producing maize in this country, it is seen that the cost averages more than twice as much per bushel in this country. There is a serious fault somewhere in the methods of our farmers.—" Farmer and Grazier."

THE PROFITS OF WHEAT-GROWING.

The reason why many farmers are giving up wheat-growing in Queensland, and devoting their energies, their land, and their crops to dairying is perhaps explainable by the following paragraph on the profits of wheat-growing which appeared in the " Pastoralists' Review" of 15th September:—

" The Victorian Lands Department has issued a pamphlet dealing with the leading industries of that State. In one devoted to wheat-growing, Mr. F. E. Lee, the late Superintendent of Agriculture, publishes a balance-sheet for a farm of 200 acres, which leaves a wheat-grower a net profit of 12s. per acre. In arriving at this result, the cost of items in connection with putting in the crop was reckoned as follows:—Preparation of the land (at 8s. 6d. per acre), £85; manure (56 lb. at 5s. per cent.), £25; seed wheat (45 lb. at 3s. per bushel), £22 10s.; drilling (1s. 6d. per acre), £15; or a total of £147 15s., working out at 14s. 9d. per acre. The expenses are arrived at as follows:—Harvesting (8s. per acre), £80; bags, £23; carting, £20; or a total of £123, working out at 12s. 3d. per acre. This makes the cost of the crop £1 7s. per acre, after paying ordinary rates for labour, and Mr. Lee strikes the balance on a 12-bushel crop realising 3s. 3d. per bushel. This calculation certainly shows a balance of 12s. per acre in favour of the grower, but how often is this realised, and how much of it is profit ? In the first place, no allowance is made for the value of the land; interest must be allowed for that, and on £10 per acre land it is a considerable item. Not only must interest be allowed for the land under

crop, but also for the land lying fallow. Then the cost of preparing the land for the crop—8s. 6d.—is a very low estimate. More probably the majority of farmers have to face a cost of 15s. per acre before their land is properly worked. Then, 45 lb. to the acre is by no means an average seeding, many farmers sowing 60 lb. and over. Then, the above balance-sheet shows seed wheat at 3s. per bushel and the crop realising 3s. 3d. per bushel, and wheat does not always bring 3s. 3d. No allowance is made for interest on cost of plant, and if the teams and implements cannot be profitably employed when not used on the wheat area, it is another item that must come off the crop. Railway freights and distance from railways must also be taken into account, so that by the time all these extra charges are averaged out, there may not be so much left out of the 12s. per acre balance to compensate the wheat-grower for the risk of bad seasons and a fall in prices, to say nothing of possible demands from the Rural Workers' Union."

It is singular that farmers fail to realise that a crop of cotton at its worst will give a net profit of from £3 to £4 per acre, and at its best as much as £8 to £9 per acre. Upland cotton is only a six months' crop, and entails no more labour during growth than does wheat, whilst the harvesting operations are infinitely simpler and cheaper. Again, cotton is not so liable to suffer from adverse seasons as wheat, since, although the plant is not exactly a perfect drought-resister, it will continue to grow and thrive in dry weather, when wheat and other cereals would suffer severely and possibly land the farmer in a total loss. Which will pay best—a 12-bushel crop of wheat selling at 3s. 3d. per bushel, from which £1 7s. cost of production and charges have to be deducted, leaving, under these exceptionally light expenses, 12s. per acre profit, or a 1,000-lb. crop of Upland cotton, selling at 2d. per lb. from which £3 6s. 4d. cost of production, picking, and other charges have to be deducted, leaving a profit of £5 0s. 4d., and this with contract labour for picking at ½d. per lb., equal to £2 1s. 8d., which, in the case of a man with a family, could be kept in hand ?

IRRIGATION IN THE BURNETT DISTRICT.

The Department of Agriculture and Stock has received a letter from Mr. P. Pearson, of Roseholm, Murgon, in which that gentleman relates his experiments with irrigation. In March last Mr. Pearson prepared 12 acres of land, and bought the seed (wheat and oats) to plant winter feed for the milkers. Excepting about 2 acres, however, that he planted straightaway, the land remained unplanted for want of moisture. About two months ago a bush fire swept the farm, and Mr. Pearson, having already an oil engine, decided to get a pump and water a patch of lucerne (between 4 and 5 acres) that he had on the bank of Barambah Creek. He made a start about the beginning of September, and he does not think he ever saw lucerne grow so fast in the best of seasons, and he had lived for years on Laidley Creek. Not only is the patch now keeping his twenty milkers going, but he will also be selling some chaff in about a week's time. He has a 4-h.p. Lister oil engine and a No. 6 Gould rotary pump with a capacity of about 4,000 gallons per hour. The water is distributed over the land by 3-in. canvas hose doing about a third of an acre per day (about eleven hours). One treatment is sufficient for one cutting. He will be able to get over more land per day in subsequent treatments as the land was thoroughly soaked.

The above goes to show what perseverance and self-reliance can accomplish. There are people who, instead of setting their wits to work to overcome difficulties, prefer to go to far greater trouble in calling in the aid of the Government to do what they could do for themselves at small outlay, as Mr. Pearson has done.

WHEAT FOR FODDER.

Mr. Arthur E. Davies, Annanvale Farm, Tableland Road, Calliope, encloses an extract from a Queensland journal which treats as follows of "Wheat for Fodder":—

"An important experiment in wheat-growing for green fodder has been made at West Dapto (N.S.W.). From the start the Thew variety made best progress, and now there is a fine crop just coming out in ear. The experiment is of great value to farmers, inasmuch as it proves that, while oats and other kinds of wheat are only half-grown, the Thew variety is fit to cut and feed the stock. By planting this kind of wheat in March or April, farmers would have valuable green fodder in the middle of winter, when green feed is scarce and milk is at its highest point in value. An important fact in connection with the experiment is that the wheat is quite free from rust or any other form of disease."

Mr. Davies asks our opinion on wheat as green fodder. Mr. Quodling, Inspector of Agriculture, Department of Agriculture and Stock, Queensland, says that young green wheat of any description is a good fodder for dairy stock. Our wheat-growers, given good weather, sow wheat in April, May, and June, which will give, if required, plenty of green feed in the winter months. The "Thew" wheat being, as stated, quite free from rust, would naturally recommend itself to our dairy farmers.

MANURIAL MIXINGS FOR AGRICULTURAL CROPS.

The proportions named in the following recipes are based on the assumption that farmyard manure has been applied, according to the rotation followed, say, at the rate of 10 to 12 tons per acre, and not in excessive quantities:—

Barley.—Three hundredweight superphosphate, 1 cwt. sulphate of potash, 1 cwt. nitrolim = 5 cwt. per acre. Mix together, and apply half before sowing and half as top dressing.

Oats.—Three hundredweight superphosphate, 1 cwt. muriate of potash, 1 cwt. nitrolim = 5 cwt. per acre.

Potatoes.—Four hundredweight superphosphate, 1½ cwt. sulphate of potash, 1½ cwt. nitrolim = 7 cwt. per acre.

Swedes.—On light soils: 4 cwt. superphosphate, 3 cwt. kainit, 1 cwt. nitrolim = 8 cwt. per acre. On heavy soils: 2 cwt. superphosphate, 2 cwt. basic slag, 1 cwt. sulphate of potash, 1 cwt. nitrolim = 6 cwt. per acre.

Wheat.—Three hundredweight superphosphate, 1 cwt. muriate of potash, 1 cwt. nitrolim = 5 cwt. per acre.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF SEPTEMBER, 1911.

AYRSHIRES.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
		Lb.		Lb.		£ s. d.
Auntie	31-7-1911	1,642	3·9	72·45	1s. 1d.	3 18 6
Queen Kate ...	10-12-1910	673	5	37·99	"	2 1 2
Lady Margaret ...	4-2-1911	645	4·7	34·13	"	1 17 0
College Lass ...	23-8-1910	596	5	33·64	"	1 16 5
Lerida	15-2-1911	632	4·7	33·44	"	1 16 3
Lark	22-12-1910	639	4·6	33·06	"	1 15 10
Rosebud	24-6-1911	666	4	29·76	"	1 12 3
Davidina	7-10-1910	470	4·9	25·98	"	1 8 1
Laurette	7-6-1911	469	4·5	23·71	"	1 5 8
Nine cows ...	...	6,432	41·3	324·16	"	17 11 2
Average ...	...	715	4·6	36·02	"	1 19 0

Lady Margaret, Queen Kate, and Davidina, Imported—First calf.
Auntie is 8 years 11 months old, and is in her sixth period of milking.

HOLSTEIN.

Daisy	2-2-1911	811	3·7	33·39	1s. 1d.	1 16 2

SHORTHORNS.

Honeycombe ...	29-8-1911	1,217	3·9	52·95	s. 1d.	2 17 4
Bangle	14-9-1911	649	4	29·0	"	1 11 5
Duchess Fanny 27th	24-8-1911	730	3·4	27·47	"	1 9 9
Rusty	4-9-1911	627	3.8	26·54	"	1 8 9
Norma	12-8-1911	545	4	24·35	"	1 6 5
Five cows ...	...	3,798	19·1	160·31	"	8 13 8
Average ...	...	759	3·8	32·06	"	1 14 9

Duchess Fanny 27th—First calf.

GRADES (GUERNSEY-SHORTHORNS).

Nancy	9-8-1911	864	3·9	37·20	1s. 1d.	2 0 3
Lemonade ...	28-6-1911	411	5·1	23·67	"	1 5 8
Two cows ...	...	1,,275	9	60·87	"	3 5 11
Average ...	...	628	4·5	30·44	"	1 13 0

JERSEYS.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
		Lb.		Lb.		£ s. d.
Cocoa	1-5-1911	536	4·4	26·54	1s. 1d.	1 8 9
Careless	16-12-1910	472	4·8	25·52	,,	1 7 8
Eve	27-6-1911	505	4	22·57	,,	1 4 5
Three Cows ...	...	1,513	13	74·63	,,	4 0 10
Average ...	...	504	4·3	24·88	,,	1 6 11

AVERAGE FOR SEPTEMBER, 1911.

No.	Breed.	Milk (lb.)	Test.	Butter (lb.)	At per lb.	Value.
						£ s. d.
9	Ayrshires	6,432	41·3	324·16	1s. 1d.	17 11 2
1	Holstein	811	3·7	33·39	,,	1 16 2
5	Shorthorns	3,798	19·1	160·31	,,	8 13 8
2	Grades	1,275	9	60·87	,,	3 5 11
3	Jerseys	1,513	13	74·63	,,	4 0 10
20	...	13,829	86·1	653·36		35 7 9
	Average	691	4·3	32·67	,,	1 15 5

Average cow value £1 15s. 5d. for September, 1911.

It will be noticed that five cows have been over nine months in milk.

(A) The following cows, namely—Davidina, Lady Margaret, Queen Kate, Rosebud, Lerida, Lark, Rusty, Nancy, Daisy, Norma, and College Lass each received the following daily ration from 1st to 28th September:—17 lb. lucerne chaff, 3 lb. pollard, 4 lb. crushed barley; and on 29th and 30th September, each received 20 lb. green stuff (lucerne) daily. They were grazed on lucerne stubble.

(B) Two cows, namely—Auntie and Honeycombe, each received a daily ration of 16 lb. lucerne chaff, 4 lb. pollard, 6 lb. crushed barley, and 6 lb. green stuff (barley).

(C) The remaining seven cows each received daily 16 lb. lucerne chaff from 1st to 28th September; 18 lb. green stuff (lucerne) on 29th and 30th.

N.B.—The chaff fed was of a rather inferior quality.

Cost of feeding for month per cow—

		£ s. d.
(A) 476 lb. Lucerne Chaff at £3 10s. per ton	=	0 14 11
84 ,, Pollard at £4 10s. ,, ...	=	0 3 9
112 ,, Crushed Barley at 3s. per bushel	=	0 6 8
40 ,, Green Stuff (lucerne), at £1 10s. per ton	=	0 0 6
		£1 5 10
(B) 480 lb. Lucerne Chaff £3 10s. per ton	=	0 15 0
120 ,, Pollard at £4 10s. per ton	=	0 5 5
180 ,, Crushed Barley at 3s. per bushel	=	0 10 9
180 ,, Green Stuff (barley) at £1 10s. per ton	=	0 2 5
		£1 13 7
(C) 448 lb. Lucerne Chaff at £3 10s. per ton	=	0 14 0
36 ,, Green Stuff (lucerne) at £1 10s. per ton	=	0 0 6
		£0 14 6

Cost of feeding for month per cow—*continued.*		£	s.	d.
11 Cows at £1 5s. 10d.	... =	14	4	2
2 ,, at £1 13s. 7d.	... =	3	7	2
7 ,, at 14s. 6d.	... =	5	1	6
Total Cost of Feeding for September ...	...	£22	12	10
Commercial Butter Returns	...	£35	7	9
Profit	...	£12	14	11

From these figures it will be observed that Auntie, though costing £1 13s. 7d. to feed for the month, returned £3 18s. 6d., showing a profit of £2 14s. 11d., while Honeycombe returned a profit of £1 3s. 9d., which proves the higher ration returned the higher profit.

The cost of feeding the whole herd was due to the high rate of fodder, and it is noticeable that the cows long in milk responded poorly to the food consumed.

THE "KINGSTON" CHEESE—A CHEESE FOR SMALL HOLDERS AND OTHERS.

We take the following article on the manufacture of small Cheshire and Leicester cheeses, which will probably prove of interest to many dairy farmers with small holdings, from the "Journal of the Board of Agriculture," London (June, 1911):—

Merchants of dairy produce have frequently asked makers to produce small Cheshires or Leicesters, varying from 1 to 2 lb. in weight, because they have known that the right article of such a size would meet with a ready sale, provided the quality could be relied upon.

The chief difficulty hitherto experienced has been that practically all attempts to reproduce in miniature such cheeses as Cheddar, Cheshire, Leicester, or Derby, have resulted in a cheese having a thick rind, thus causing much waste when cut up, and also one which failed to ripen properly, due to the fact that it dried up and became hard and chalky in texture, with little or no flavour.

In many cases the processes of manufacture and treatment have been identical with those adopted in the make of the larger cheeses, except that on the curd being ready for grinding small moulds of the required size have been substituted for the usual larger ones.

Naturally, the results have been unsatisfactory. After much preliminary experimental work, we have been able to devise a system which, if carefully followed, will produce a small cheese varying in weight from 1 to 2 lb., which embraces the qualities of a hard-pressed variety, and yet which is ripe and ready for consumption ten days after making.

In placing before the public a description of the "Kingston" cheese, and the methods adopted in its manufacture, we have in view three main objects:—

Firstly: To point out that it supplies a demand for a cheese of a size suitable for the table of the average householder; one which, as regards early maturity and the incorporation of moisture bears some relation to certain classes of soft cheese, while at the same time it possesses the distinctive quality of a typical ripened hard-pressed cheese with respect to flavour and texture.

Secondly: The utensils required and the accommodation necessary for the making and ripening do not require to be considerable, and makers of small means and limited space can attain quite satisfactory results.

Thirdly: It should be a particularly suitable cheese for small holders to make. The amount of milk required would not necessitate the keeping of many cows, and the fact that the ripening process is rapid means little loss of weight during ripening, and also provides for a quick return financially; while the actual time involved during the process of making is comparatively small.

While this cheese has a flavour essentially its own, the texture may be described as soft and granular, embodying the salient features of a typical Cheshire and Leicester, while to the touch it is rich and buttery. when bored with a "trier" the fatty, smeary appearance on the back of the iron is such as is usually found only in a ripe old mellow cheese.

If the top surface of a mature cheese be gently pressed with the thumb in the manner so well known to those in the trade, a perceptible break in the surface round the edge of the thumb will be noticed, showing the delicate and fragile nature of the texture.

Accommodation and Utensils.

Two rooms are necessary, one as the making and press room, and another to serve as the ripening-room. A suitable size for the former is 12 ft. square, and for the latter about 7 ft. square. It would be possible to manage with one room only, but the great disadvantage would be that on the windows being opened at the end of the day's work, cheeses which had previously been made would be chilled and the ripening process affected.

During the night a cheese-making room should, in summer, be fully opened to the air, the atmosphere being sweetened thereby and the temperature lowered.

It is equally important that the room in which the cheeses are ripened should be kept at an even temperature; obviously if one room only be available, the best results cannot well be expected. Each room should be ventilated in a thorough manner, and both ventilators and windows be made to open and close with ease.

Throughout the process of making it is desirable to have the room at a temperature of about 60 deg. F.; if, however, such a temperature can be obtained only by keeping windows, door, and ventilators continually closed, this point must be waived.

A very practical means of securing the required temperature in the ripening-room, at a minimum cost, is to have this room arranged on the other side of the wall from, say, the kitchen fireplace; this is not intended for general application, but in this particular case.

We have found that in order to secure the necessary quick ripening the room must be at a temperature somewhat higher than is usually the rule; a temperature of 60 deg. F. to 65 deg. F. is satisfactory, and the disadvantages often experienced in ripening larger cheeses at a fairly high temperature have not been met with.

In the making-room, shelves are required for the various smaller utensils, and also, should it be necessary, for one day's cheeses, previously to their being taken from the mould; a table or bench is also needed on which to turn and bandage the cheeses.

In the ripening-room, provision should be made by means of "sparred" shelves for the accommodation of about fourteen days' cheeses; the shelves to be sufficiently wide for one cheese. We have found that by using sparred shelves a much freer circulation of air is obtained, a fact which materially assists in obtaining the desired ripening.

It is immaterial whether the shelves are arranged round the walls or in the centre of the room, provided proper ventilation is obtained.

In addition to the accommodation above noted, a small outhouse near at hand would be an advantage, as a boiler or copper could be fixed therein.

A sure supply of hot water is essential, and if no room is available, a portable copper can be bought at a small cost, and can be fixed just outside the dairy or moved about at will.

As regards the utensils, some initial expense is inevitable; it is, of course, possible to make good cheese by the aid of very primitive appliances, but we are strongly of opinion that for the purpose we have in view it is preferable, and in the end much more economical, to obtain as far as possible up-to-date utensils of a suitable and convenient nature.

However careful and systematic the maker may be, it is not an easy matter to produce an article of uniform quality throughout; and, as uniformity is one of the essentials to successful dairying, any mechanical assistance to the attainment of this end should be warmly welcomed, even if for the time being some extra expenditure is entailed.

Any of the principal dairy-utensil manufacturers can supply what is required, though the prices given below may vary to some extent:—

Metal vat, with wooden rack and suitable stand, sufficiently large to enable the maker to deal with 12 gallons of milk, £2 10s.

Two small American knives, one vertical and one horizontal, the blades of the former being about ⅜ in. apart and the latter ½ in.; when ordering these the size of the vat should be borne in mind, and the knives be obtained of such width as will ensure them cutting the curd without any "overlapping," so avoiding variation in the size of the pieces of curd.

Curd mill, with double tinned iron rollers, such as used for the grinding of Cheshire curd, £2 15s. In order to maintain the typical nature of the cheese it is necessary that before moulding the curd shall be ground to a very fine state, a condition which cannot well be obtained by breaking with the hands.

Press.—Double level single press, sufficient to give 1½ cwt. pressure dead weight, £2 10s. As the cheeses only require a few hours' pressure, one press is quite sufficient, and will be available for each successive day's make. This appliance we consider is of great importance if the cheese is to be secured true to type; we have tried many methods of pressing, but find that varying weights direct on each cheese singly, are not satisfactory, inasmuch as the cheese dries and fails to form a coat, while instead of ripening quickly, it becomes chalky and tasteless.

Moulds.—These are made in well-tinned metal, and a sufficient number should be obtained for two days' make of cheese. The size will, of course, vary according as the cheeses made are approximately 1, 1½, or 2 lb. in weight; the following measurements are suitable, where the cheeses are to be about 1 lb. weight, and other moulds should be in respective proportions:—Height 4 in., and diameter 3½ in., the bottom of the mould being closed except for a hole in the centre 1½ in. diameter. A loose tin follower is used in the bottom and a wooden follower 1 in. thick is needed to cover the curd at the top.

In addition to the above, there will be required a thermometer, measuring glasses, cheese cloth, bandaging cloth, and the usual supply of buckets, brushes, ladles, scoops, &c.

It is generally understood that in establishing a cheese-making dairy of, say forty cows, the outlay for utensils averages about £2 per cow. It will be seen that the total outfit we recommend can be obtained for less than £10, thus keeping well within range, even if the cheese-maker has but four or five cows.

Method of Manufacture.

In the making of this, as in all cheeses, the first essential is clean, wholesome milk, free from taint—*i.e.*, any undesirable odour or flavour—and untreated by chemicals and extremes of heat or cold. The "Kingston" cheese is made from mixed milk, equal parts of the morning's and evening's milking.

The evening's milk having been brought into the dairy properly strained and filtered, is poured into the vat, and by means of cold water in the jacket of the vat the temperature is reduced.

It is well known that taints are due almost entirely to the growth of certain micro-organisms; and, further, that such taint-producers flourish at a fairly high temperature, or at one fairly low. The type of organism required by the cheese-maker is that which produces lactic acid and no taints, and it is therefore necessary to have the milk during the night at such a temperature as will be favourable to these bacteria, rather than to those already mentioned.

The jacket of the vat having been filled with cold water, the milk is gently stirred at intervals in order to equalise the temperature and also to assist in getting rid of that odour, too often present, known as a "cowy" odour.

If the first supply of water is not sufficient, this should be run out and the jacket refilled; care being taken, however, that when the vat is left for the night the water in the jacket is about the same temperature as the milk itself, or the cream will rapidly rise.

A wooden rack is placed over the vat, and covered with clean cheesecloth or muslin until morning; to use a lid for this purpose is a mistake, as it prevents free access of air.

The following morning the cream is skimmed off, warmed in a pan over a copper, and poured back into the vat with the morning's milk; the slight heating assists in the mixing of the night's cream with the milk.

In the making of any quick-ripening hard-pressed cheese, an appreciable amount of acidity must be developed in the milk before the rennet is added. From the practice of adding some agent to "start" the acidity in milk for cheesemaking we derive the term "starter," which may be defined as follows:—"A starter is a growth or culture of those bacteria which best bring about the required amount of the right kind of acidity, and also the desired flavour; such culture when once obtained being kept pure."

Except in special circumstances, it is more satisfactory to use a pure or commercial starter. Its propagation and use are matters of great moment, and full particulars and instructions reltive to these points are given in a leaflet prepared for the use of farmers and dairymen by one of us (Alec. Todd) and issued from the college.

The starter should be strained into the vat through a fine sieve or muslin when the first morning's milk is added, at the rate of about ½ per cent. (or, approximately, ½ pint to 10 or 12 gallons).

The temperature of the milk is now raised to 84 deg. F. by means of hot water in the jacket, the milk meanwhile being frequently stirred to mix the starter, and to bring about a uniform temperature.

The cheese may be made either white or coloured. We have usually made the latter, and if this be done the annatto should always b added and well stirred in at least ten minutes before renneting; 1 dram of annatto to 4 or 5 gallons of milk gives a suitable colour, and on being added it should always be diluted with water or milk to insure a more perfect mixing. One of the fundamentals which must be attended to, if a uniform quality of cheese is to be assured, is to have practically the same

amount of acidity present in the milk each day at the stage when the rennet is added. The most satisfactory method of estimating this is by means of a "Rennet Test," which consists in determining the amount of acidity present according to the length of time taken for a given quantity of rennet to coagulate a given quantity of milk at a definite temperature. The apparatus required includes a measuring glass graduated in fluid ounces, to hold 4 oz., a smaller glass measuring 1 dram, a thermometer, and a stop-watch, or a watch which is clearly marked in seconds.

In making the test, 4 oz. of well-mixed milk out of the vat are taken, exactly 1 dram or 3½ c.cs. rennet are measured into a cup, and three or four short pieces of hay or straw, say ¼ in. long, are put in to act as indicators. The test is always conducted at 84 deg. F., whatever the type of cheese, without regard to the season of the year. A thermometer is placed in the milk, and in order to bring both milk and rennet to the required temperature, a bowl or small tub should be at hand containing water about 90 to 95 deg. F. The temperature obtained, a thermometer is placed in the rennet cup, the milk poured in, and stirring with the thermometer commences simultaneously; the time by the second hand of the watch is noted. Having stirred for fifteen seconds. the thermometer, which should still register 84 deg. F., is taken out, and immediately the straws stop the time must be noted. This is the point of coagulation, and the number of seconds elapsing from the time the milk comes in contact with the rennet until the straw stop is taken as the rennet test. We have found that a test of twenty-five seconds is suitable as an average, but the actual test must be decided by individual makers on account of variation in milks and changes of season.

On no account should the milk be renneted before sufficient acid is present, or the process of manufacture will be lengthened to the detriment of the cheese; while, on the other hand, if the renneting be delayed after a suitable test has been obtained, a quick over-acid cheese is the result. When the temperature and rennet test are satisfactory, the rennet is added at the rate of 1 dram to 2½ gallons of milk, after having previously diluted it with six times its volume of water to facilitate the mixing with the milk, the whole is thoroughly stirred for five minutes, and then the surface of the milk gently stirred until the rennet shows effect. If the operation is continued beyond this stage the milk is "over-stirred," with consequent loss of fat and deterioration of quality in the cheese.

The vat is covered with a lid, and the contents left until set or until coagulation is complete; this should be about forty to forty-five minutes from the time the rennet was added.

When sufficiently firm, a state at which the coagulum should break clean over the finger, cutting takes place. This is accomplished by cutting lengthwise and across with the vertical knife, and lengthwise with the horizontal knife, thus leaving the sections of curd about half an inch by a quarter of an inch. The operation must be most carefully carried out, as an even cutting enables the maker to scald evenly, and also assists considerably in a unform expulsion of the whey. If an acidimeter be used the acid test at this stage should be .12 to .13 per cent. The advantages of including this apparatus, which is inexpensive, in the fitting up of a dairy are many, and the writers will be very glad to supply to any reader on application full information relating to its uses. After cutting, the curd remaining on the bottom and sides of the vat is loosened, and the whole gently stirred for ten to fifteen minutes in order to separate the pieces of curd; at the same time a thin film forms around each particle, thus preventing to a great extent loss of fat.

The process of scalding, cooking, or heating then commences, which consists in gradually brining the contents of the vat uniformly to a suitable temperature, that most satisfactory being 88 deg. to 90 deg. F. Hot

water is poured into the jacket of the vat, and the stirring carefully continued as before. Renewal of the water is necessary, and the final temperature should be attained in twenty minutes.

The objects of the heating are:—

1. To firm-up the curd.
2. To expel the moisture gradually and uniformly.
3. To assist in the development of acidity.

When the "scald" temperature is reached, stirring is continued until a suitable firmness is obtained, when the curd is ready to pitch—that is, to be allowed to settle at the bottom of the vat. This is a condition almost impossible to appreciate except by practical demonstration and experience, but usually the time taken from commencing to stir until pitching is one and a-quarter to one and a-half hours; the curd should not be mushy, while if a particle be split it should be of an even consistency and no free whey apparent. A period of twenty to thirty minutes is sufficient for the curd to lie in the whey, but before running off the latter a test should be made on a hot iron, and if convenient, with the acidimeter.

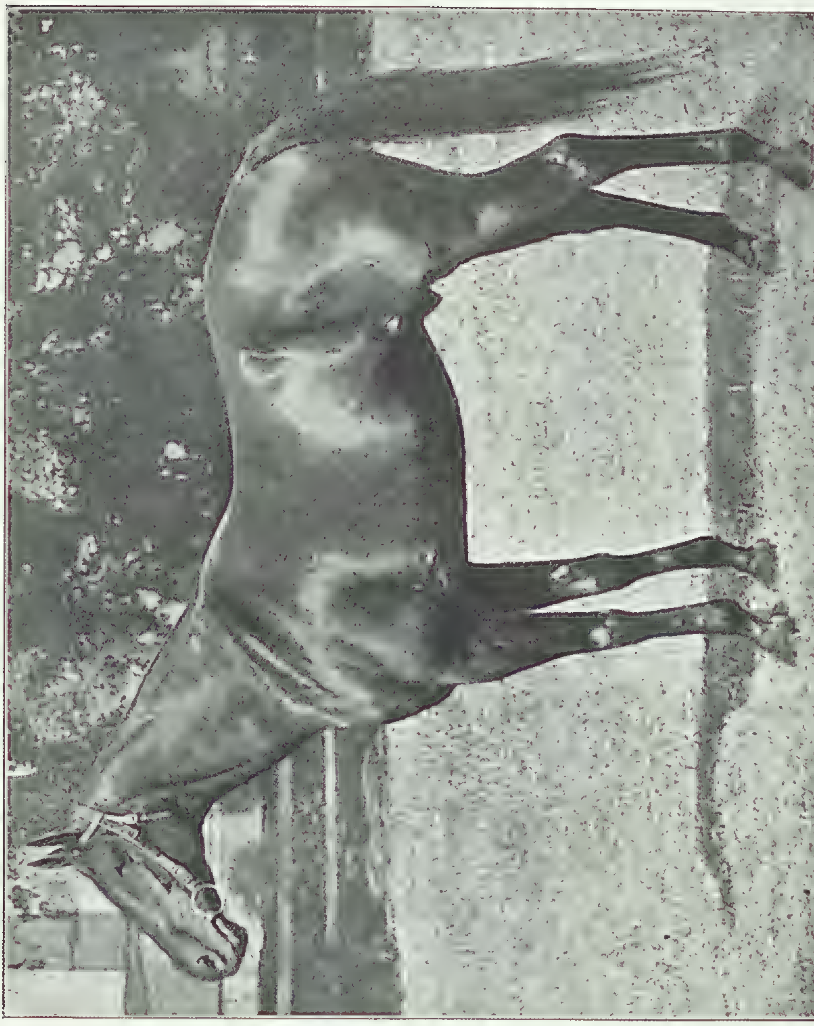
To perform the hot-iron test a little curd is squeezed in the hand until sufficiently pressed to hold firmly together and then applied to an iron—a plain file is suitable—heated to a black heat, in such a manner that if there is acidity in the curd, it—the curd—will draw away in fine silky threads. If the threads on the iron are one-eighth of an inch long the whey is drawn; at the same stage some whey squeezed from the curd and tested with the acidimeter shows .15 or .16 per cent. acidity.

The drawing of the whey is one of the most important stages in the hole process of making, and it is essential that there should be the right degree of acidity present; if not sufficient, the curd will be soft and retain too much moisture, resulting in a "sweet" or "weak" cheese. If too much acidity is present, an "overacid" curd will be obtained, producing a hard, dry cheese.

In commencing this operation the curd is drawn up to the end of the vat away from the tap, and slight pressure applied to assist in the expulsion of the whey. When this is complete the pressure is taken off and the curd cut into 4-in. cubes, and taken out into a cloth on a rack, each cube of curd being turned in so doing.

The rack is placed back in the vat, the curd covered up well with cloths, and left for fifteen minutes. Again, the curd is cut into similar cubes, turned in bulk, and each cube broken into halves; this assists materially in getting rid of the whey, and has considerable influence on the short texture so much required in the final product. It is again covered up and left for an internal of fifteen to twenty minutes. During this time the acidity is gradually developing, and this of itself assists in the draining of the whey. The secret of success in the management of the curd after the drawing of the whey consists largely in the ability of the maker to control the moisture content. The expulsion of the whey and the development of acidity must proceed hand in hand as each acts and re-acts upon the other. The turning and breaking are usually practised two or three times, but this is dependent upon the general condition of the curd as regards dryness and acidity. When ready for grinding—a stage which is generally reached one hour after the drawing of the whey—the test on the hot iron should be three-quarters of an inch, the condition of the curd at this point being soft and velvety to the touch, while it should break short rather than have any tendency to toughness. It is ground to a fine state, and on pressing a handful of curd it should be moist, mellow, and free, with a smaller amount of excess moisture than a Derby,

Plate XV.



"YOUR MAJESTY," BY "PERSIMMON," OUT OF "YOURS," RECENTLY SOLD FOR THE ARGENTINE.

yet more than is required in a Cheddar cheese. Salt is added at the rate of 1 oz. to 3 lb. of curd, and moulding is done at once; the weight of curd obtained will vary according to the season, the average yield being 1¼ to 1 1/3 lb. per gallon of milk. When the moulds are quite filled they are put under the press, the acidity from press tested with the acidimeter showing .5 to .6 per cent.

The cheeses are left for two hours, just the dead weight of the press being applied, when they are turned, and pressed again for a further period of two hours; the pressure is then taken off, the cheeses turned again, and left to stand on the shelf during the night. During the following day the cheeses are allowed to remain in the moulds, and a slight greasiness appears on the coat. On the morning of the second day the coats are scraped with a knife until smooth, then bandaged, using calico and paste; it is an advantage to allow the bandage to come well over the edges in order to preserve them from cracking. After remaining about a day for the bandage to dry a little, the cheeses are removed to the ripening-room, where they must be turned daily. In ten days' time they should be ready for sale, and on stripping off the calico a smooth, clean surface is found, while the ends of the cheese not covered with the bandage will be nicely coated with mould. In consideration of the fact that the cheeses are small, and consequently much surface is exposed to the air, the percentage of loss in weight is small, 1 gallon of milk producing slightly more than 1 lb. of ripe cheese. If for retail trade, the cheeses should be offered for sale in a manner pleasing to the eye, and wrapping in tin-foil is to be recommended.

THE DAIRYMAN'S PROFIT.

The minimum profit at which a dairy farmer can afford to work his cows is a matter for each to compute according to his acreage and the labour he has to employ. There are many dairymen at present trying to make a living from cows that do not average more than 300 gallons a year. They do not cull, and when they say there is no profit in cows they are, under their system of working, coming close to the truth.

£22,500 FOR A SON OF "PERSIMMON."

Our illustration, which is taken from the "Illustrated Sporting and Dramatic News," of the well-known racehorse "Your Majesty" will doubtless interest horse-breeders and racing men in Queensland. The "News" says respecting this horse, which has been sold to a buyer in Buenos Ayres:—

"The St. Leger and Eclipse Stakes (1908) winner 'Your Majesty,' which Mr. Ernest Tanner, of Newmarket, so well known as a buyer of high-priced bloodstock, has sold to Mr. Luis Castells, of Buenos Ayres, left Newmarket, together with twelve well-bred mares, on Tuesday week for the Albert Docks, and will proceed from thence to the Argentine. In the opinion of all the best judges who have seen him, 'Your Majesty,' who has won over £22,000 in stakes, is in make and shape without fault. His breeding, by 'Persimmon,' out of 'Yours,' dam also of 'Our Lassie'—winner of the Oaks—is perfection. His foals, too, are something out of the common. Mr. Tanner thinks he is certain to be as great a success at the stud as 'Cyllene,' which he also sold to an Argentine breeder. The price paid was £22,500. Mr. J. B. Joel takes over 'Grey Leg,' which Mr. Tanner bought with the intention of sending out."

Poultry.

REPORT ON EGG-LAYING COMPETITION, Q.A. COLLEGE, SEPTEMBER, 1911.

Three thousand one hundred and thirty-eight eggs were laid during the month, an average of 130.75 per pen. One hen from Mr. Stewart's No. 3 pen died, and was replaced. J. Holmes wins the monthly prize with 148 eggs. The following are the individual records:—

Competitors.	Breed.	September.	Total.
J. F. Dalrymple, N.S.W.	White Leghorns	145	664
Range Poultry Farm	Do.	133	653
E. A. Smith	Do.	137	635
Yangarella Poultry Farm	Do.	121	634
J. Holmes	Do.	148	627
Alex. Smith	Do.	129	611
Cowan Bros., N.S.W.	Do.	132	586
Mrs. E. A. Kinnear, S.A.	Do.	141	582
A. Hollings, N.S.W.	Do.	117	579
Jas. McKay	Do.	129	571
A. J. Cosh, N.S.W.	Do.	132	562
J. Gosley	Do.	146	549
S. Chapman	Brown Leghorns	138	542
R. Burns	White Leghorns	144	533
A. H. Padman, S.A.	Do.	136	515
H. Hammill, N.S.W.	Do.	119	511
R. Burns	S.L. Wyandottes	128	478
J. Zahl	White Leghorns	138	471
A. Astill	Do.	117	397
Mrs. A. A. Carmichael	Brown Leghorns	130	396
R. W. Goldsbury	White Leghorns	130	355
J. K. Stewart	White Plymouth Rocks (1)	118	249
J. K. Stewart	Do. do. (3)	121	226
J. K. Stewart	Do. do. (2)	109	175
Totals	...	3,138	12,101

BLACK ORPINGTONS.

Most poultry breeders, not only in Queensland, but in other parts of the world, perfer the Orpington to any other breed. There are some, of course, who pin their faith on those splendid layers, Leghorns. Others have a fancy for Plymouth Rocks, others for Game varieties, but the Orpingtons and the great array of the Wyandotte breed, hold a premier place in the estimation of those who keep birds for general utility. The Wyandotte is very much in evidence at shows, especially in Great Britain, but the Orpington is, without doubt, the most popular fowl in the world. What is the reason for this? It is because of their strong basis of utility. On this point the Rev. T. W. Sturges, in his excellent work "The Poultry Manual," writes:—"They serve the dual purpose of providing large birds for the table with flesh of first-rate quality, and they are good

layers of large, brown eggs. They are a docile breed, easily kept within bounds, and the hens make gentle mothers. The chickens are hardy and easily reared. The Orpingtons are not yet old enough as a breed to have been entirely spoilt by the arbitrary selection of fancy points, though the Black Orpington, the oldest of the family, is dangerously near it.

The Orpingtons are usually classed amongst the British breeds, because they were manufactured in England in the village of Orpington, near Chislehurst, in Kent, whence they got their name. Mr. Cook, the originator, in describing how he manufactured the Black Orpington, tells us that, with the wastrels from the good breeds he formed the Black Orpington, using birds that represented the poultry of the three continents—viz., Minorcas from Europe, Langshans from Asia, and Plymouth Rocks from America. At first they were called mongrels, and they looked it, but the blending of the several breeds was not complete, consequently they did not breed true. Like did not produce like until the innate predominance of first one and then another feature prevailed. But they sprang into popularity because of the novelty of their appearance, and, secondly, because of their undoubted utility and hardiness; and they still maintain their popularity because the fancier has seized upon them and fixed their points.

How it was Done.

The method adopted by Mr. Cook in founding the Black Orpington breed is stated, in a paper read at the Poultry Conference, Adelaide, South Australia, on 18th April, 1910, by Mr. F. C. Lampe, to have been as follows:—

A large black Minorca cock was crossed with black sports from Plymouth Rocks. Pullets from this cross were mated with clean-legged Langshan cockerels, and the produce was bred to the short-legged, deep-bodied type so much admired in Black Orpingtons. The result was a black fowl, with a green sheen, clean black legs, plumper than the average Langshan, white skin and flesh, well-shaped carcass, and above all, an excellent winter layer of brown eggs. One of the chief components of the Plymouth Rock breed being probably the Black Java fowl, which, in its turn, had much in common with the Langshan, the double Langshan element gradually overpowered the Minorca element, until Black Orpingtons reverted to little else than clean-legged Langshans. The eggs lessened in size as the Minorca element lost power, and the colour of the eyes—often thin red—reverted to the black or brown of Langshans. Later on, in about 1891, Mr. Joseph Partington introduced what was considered an improved type of Black Orpington, and provided practically new blood. It is supposed that he utilised none of the cross used by Mr. Cook, and that the strain probably contained Cochin blood. Mr. Partington's bird being bigger, more fluffy, and all dark-eyed, found greater favour on the show bench, and he completely scooped the pool.

The Black Orpington to-day is anything but "close" (says Mr. Sturges) feathered, and this departure from the still published Standard of Perfection has done more than anything to diminish its usefulness and popularity. Beyond all question, it is not the first-class layer it was for the first ten years of its career, and though it has gained in apparent bulk, its usefulness has declined. There are still good and useful strains in existence, and it is noteworthy that in the Australian laying competitions, which extend over a period of twelve months, the Black Orpington has more than once headed the list with an average of 250 eggs to its credit."

THE STANDARD FOR BLACK ORPINGTONS.

generally recognised is, according to Mr. Lampe, as follows:—

COCK BIRD.

The head must be small, neat, and fairly full over the eye, and carried erect. Many show judges pay too little attention to the head of the Orpington, and coarse-headed birds frequently occupy prominent positions on the exhibition bench. The importance of a small head cannot be too strongly emphasised; it generally accompanies all the excellent qualities that formerly belonged to the Croad Langshan. The eye should be dark-brown, or even black, in colour, and should be full, bright, and intelligent. An eye with all these characteristics is seldom found on a very coarse-headed bird. The comb should be of medium size, rather thin than otherwise, erect, evenly serrated, and free from side sprigs. The wattles should be of medium length and well rounded, and the ear-lobes rather long, thin, and fine in texture. The comb, face, ear-lobes, and wattles should be a bright red colour. The beak should be short and strong, nicely curved, and of black or very dark horn colour. The neck should be not too long, well curved, and with full hackle.

The Body.—The breast should be broad, deep, and full, and carried well forward; the breast bone straight and fairly long, the whole body looking massive and solid, and set fairly low. Particular attention should be paid to preserving the correct shape. The back short, with broad strong shoulders, the saddle rising slightly, with full hackle; the wings well formed and carried close to the body; the skin thin and fine in texture and white in colour; flesh white and firm. The tail should be of medium size, not too large by any means, and inclined backwards and slightly upwards.

The Legs and Feet.—Thighs and shanks should be short, powerful, and well apart; the shanks free from feathers, black in colour, turning lighter after the first moult; toes, four in number and well spread. General shape and carriage should be cobby and compact, erect, and graceful. The plumage should be close. It is impossible to pay too much attention to this point. It is to be deeply deplored that so much encouragement is given by a certain section of show judges to birds showing an extraordinary amount of fluff. The breeding of birds for fluff tends to decrease the laying powers of the hens, and fluff generally accompanies an uncommonly thick skin, loose, ungainly body, coarse head, general sluggishness, and lack of vigour and stamina. Such birds are useless from the commercial standpoint, and are an eyesore to all practical breeders. The plumage should be black in colour, with a green sheen or lustre, and the weight should be about 9 lb. to 11 lb. when fully matured.

THE HEN.

Practically the same characteristics apply to the hen, with one or two exceptions. The cushion should be small, but sufficient to give the back a curved appearance; weight about 8 lb. or 9 lb. when matured. In South Australia the Black Orpington threatens to rival the White Leghorn in popularity. It shows remarkable adaptability to any sort of climate, and though it flourishes in winter better, probably, than any other breed, it still withstands the summer heat almost as well. It is a docile bird, very easily handled, can fly very little, and stands confinement well, though, if allowed free range, it is a vigorous forager. For these reasons alone it is an ideal home bird. The plumage being of self-colour, the bird always looks and wears well. Nothing could be more beautiful than

the rich beetle-green sheen or lustre of its plumage. There are no markings or lacings to breed for, and, whereas other birds mostly deteriorate in colour or markings after their first season, the Black Orpington tends to improve in the richness of its plumage colour. As a table bird it is one of the best, with its white skin of fine texture and its tender, white, juicy flesh and big, well-shaped carcass. In this State it is opposed by no absurd prejudice against its black legs, and readily commands top market prices by reason of its size and quality.

There is a particularly good local demand for the cockerels at prices remunerative to breeders, and the hens, even with their second season, are eagerly snapped up. Apart from its selling value, the Black Orpington breeder has the satisfaction of never being without a delicacy for his own table; for the person who is desirous of breeding crossbreds for table purposes, there is no better cross than a Black Orpington hen mated with any variety of Game cock.

LAYING CAPACITY.

The Black Orpington hen, moreover, is unexcelled as a layer of brown-tinted eggs. A strong point in its favour is its ability to lay in the coldest of weather, when eggs are scarce and bring high prices. Even as an all-the-year-round layer it is by no means to be despised, though its tendency to broodiness renders it unable to cope with the best of the light breeds during summer months. Owing to the abnormal craze for records as regards mere number of eggs the commercial value of the Black Orpington as a layer stands in danger of being overlooked. It must not be forgotten that a big percentage of its eggs are laid in the dear season; hence the total yearly value of its eggs is much greater than appears to first glance, and at the present day it stands at the top of the heavy breed class as a layer. The brown tint of its eggs is a strong point in its favour as a back-yard bird. It is certain that among housewives there exists a very strong prejudice in favour of brown-shelled eggs against white-shelled eggs. By the opponents of the Black Orpington it is urged that its egg is smaller than one would expect from such a big bird. Judicious selection on the part of every breeder would, in a couple of seasons, greatly increase the average size of the egg. The system adopted by the egg circles in this State of grading eggs according to size, together with the action of the Poultry Expert in raising the minimum average weight of eggs at the laying competitions to 24 oz. per dozen, should stimulate every Black Orpington breeder in default to breed for a better-sized egg.

Public competitions have proved that it is possible, by careful selection, to produce a Black Orpington well up to the standard weight that can, in a year, lay a good number of eggs of a high monetary value and of more than average weight.

AS A SITTER AND LAYER.

As a sitter and mother the Black Orpington hen is hard to beat. Even in these days of extensive artificial hatching there is, during certain months, an extraordinary demand for broody hens. The practical breeder with a few dozen Black Orpington hens in his yard is seldom short of a broody hen, even in the depth of winter, and can always obtain a remunerative price for such a treasure. The excessive tendency to broodiness is a great weakness in some strains, but, if desired, it can be gradually bred out. To do so necessitates a lot of work in keeping complete records of each bird, but it is worth the trouble. Black Orpington chickens are remarkably hardy and easily reared. They grow quickly and fledge well, especially the pullets. The best time to hatch them in this State is during the winter months from May to August. They flourish in the open in

the coldest and wettest of weather as no other breeds seem able to do. They are wonderful foragers and do well with a free run for the first four months. They are black and yellow or white when hatched. The chickens showing least black generally turn out the most brilliant birds when matured.

THE CULLING PERIOD.

At from four and a-half to five months old it is advisable to cull out the cockerels and market those not up to standard type. At that age there is a handsome profit in them. They should average about 5 lb. in weight, and about 7d. per lb. live weight can be obtained locally for them. They can bring even better money exported oversea. The early pullets come into lay when about five months old, and the later hatched ones at about six and a-half months. Although a big bird, the Black Orpington is not a big eater, and does well on a moderate ration. If heavily overfed, particularly in the second season, it is liable to put on too much fat, and deteriorate in laying. To sum up, briefly, there is no better all-purpose fowl in Australia to-day than the Black Orpington. It is exceptionally hardy, a good sitter, a splendid table bird, an excellent layer, a moderate eater, docile and easily handled, while it does well either in confinement or on an open run.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1910.				1911.								
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
North.													
Bowen	3·75	0·30	3·89	5·36	23·72	7·57	10·66	1·64	0·12	0·2	Nil	0·15	Nil
Cairns	1·34	1·67	7·27	11·59	34·49	27·43	35·35	52·31	2·08	1·44	1·48	0·27	0·6
Geraldton (Innisfail) ...	11·51	3·18	7·30	4·77	36·96	35·51	28·39	50·53	3·58	5·10	6·20	0·79	0·30
Gindie State Farm ...	...	...	..	3·87	11·69	4·15	2·29	0·29	0·29	Nil	Nil	0·49	...
Herberton	0·58	0·43	4·93	9·71	11·43	13·16	15·35	14·17	0·58	0·36	0·40	0·5	Nil
Hughenden	2·75	1·57	3·41	1·13	9·15	3·76	0·17	6·29	0·4	0·2	0·2	Nil	Nil
Kamerunga State Nurs.	...	2·06	...	..	...	23·08	...	52·28	151·0	...	...	...	...
Mackay	4·32	0·7	2·67	2·15	30·52	13·04	14·41	3·14	0·77	0·22	0·43	0·18	0·3
Mossman	2·90	3·17	10·36	19 91	32·76	21·95	71·64	37·10	1·44	0·33	1·28	...	...
Rockhampton	1·62	0·99	4·17	2·46	9·64	21·07	6·39	1·44	0·56	Nil	0·24	1·17	Nil
Townsville	3·34	0·11	2·53	6·77	25·40	19·24	4·24	3·02	0·7	0·11	Nil	Nil	Nil
South.													
Biggenden State Farm	...	2·36	4·59	5·96	10·37	7·34	6·25	...	...	...	...	...	0·79
Brisbane	2·72	3·27	2·49	13·99	10·30	5·84	4·69	0·88	0·90	0·9	1·70	2·22	0·84
Bundaberg	2·33	0·70	8·39	1·58	21·05	9·75	4·31	1·46	0·56	Nil	0·37	1·15	Nil
Crohamhurst	2·30	3·83	3·31	6·20	28·85	19·20	16·67	2·94	1·21	0·13	3·58	2·62	0·51
Dalby	2·11	3·96	4·09	3·29	8·08	2·24	3·20	0·76	0·91	Nil	0·68	0·43	0·42
Esk	4·65	3·41	3·84	7·53	11·90	6·04	3·54	0·99	1·90	Nil	...	1·51	2·04
Gatton Agric. College	...	3·60	2·85	6·84	12·03	3·98	2·80	1·38	0·58	Nil	0·72	0·90	0·96
Gympie	1·54	2·90	3·16	1·96	9·13	5·33	6·02	1·88	0·32	Nil	0·97	0·48	0·26
Ipswich	1·55	3·70	1·96	5·04	8·15	4·19	2·51	1·33	0·42	Nil	0·59	1·12	0·34
Maryborough	1·22	1·53	4·19	3·19	16·93	6·58	7·20	2·61	0·16	0·11	0·62	1·47	0·9
Roma	0·46	3·64	4·39	0·96	11·52	5·94	1·25	0·14	1·13	Nil	0·67	1·55	0·87
Roma State Farm ...	0·38	2·95	3·50	7·97	9·72	...	5·39	0·04	·02	...	...	1·39	0·74
Tewantin	1·52	3·17	7·71	8·25	20·84	8·50	18·11	1·78	0·57	0·22	2·53	1·07	0·4
Warren State Farm ...	...	0·45	...	...	...	11·75	3·17	...	...	Nil	0·6	1·01	...
Warwick	1·39	2·20	3·86	3·46	7·13	2·01	3·12	0·74	1·04	Nil	1·20	1·50	0·80
" Hermitage State Farm	...	...	...	...	...	...	...	...	...	...	...	...	...
Westbrook State Farm	...	2·98	...	4·44	5·26	3·90	1·76	5·50	0·79	0·1	1·1	0·54	0·82
Yandina	0·88	3·34	5·16	16·05	12·04	10·73	12·02	2·68	0·28	Nil	2·43	Nil	0·30

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

Plate XVI.

Papaw Trees at Mr. C. B. Steele's, Gympie.

The Orchard.

PAPAW CULTIVATION.

With reference to our article in the August issue of the "Journal" on the subject of "Papaw Culture," and "Feeding" the Papaw, Mr. C. B. Steele, Gympie, who, judging by the photograph of some of his trees, appears to have met with considerable success in proving that the Gympie district is distinctly favourable to the production of this tropical fruit. Mr. Steele's method of "feeding" the tree would seem to be preferable to that of Mr. Jesse (of the Jolo Archipelago, near Borneo), which consisted of boring a hole in the trunk of the tree and inserting a rubber tube connected with a bottle of sugar and water. This plan would be objectionable where white ants are numerous, and we should imagine that it might be conducive to the eventual decay of the trunk. Mr. Steele writes:—

I am sending you by this mail, under separate cover, a photograph showing what can be done on the Gympie goldfield in the way of papaw cultivation.

The centre tree in the photograph is about two years old, and this is the second time of bearing. The trees on either side are about eighteen months old, and bore for the first time this season. The tree on the right is probably the Singapore species, while that on the left is the Hawaiian. I would like to know what is the name of the fruit on the centre tree.*

You will notice I have adopted the system of heading back the trees—that is to say, have cut off the tops, and which I think is an excellent method to adopt when growing this fruit in a cold climate, as by that means one is able to give better attention to the trees being covered as a protection against frost, and one gets more branches of fruit and naturally much nearer to the ground. I have also adopted the system of feeding up the trees by pouring sugar down the hollow limbs when the tops have been taken off, and which I think should be just as efficacious as the process you gave an account of some time ago by which the limbs were fed by the insertion of an indiarubber tube into the trunks about a foot above the ground, the other end of the tube being placed in a quart bottle of sugar and water, and the contents thereby syphoned into the tree.

These trees are growing at an elevation of about 300 feet above the sea, with a north-westerly aspect, and a little over 100 yards from the Town Hall, Gympie.

I have also tried the experiment of heading back the male tree, but so far have not been successful in getting fruit thereby; but for all that I think one gets a better and certainly a more attractive tree by doing so.

The winter just passed was a very severe one; but, with the exception of spoiling the appearance of the tree through the larger leaves dying off and the growth for the time checked, the frost does not appear to have injured either the fruit or tree itself.

It should be mentioned that a goodly number of the fruit were picked prior to the photograph being taken, so one can readily see that the trees were pretty well laden.

In the case of the smaller growth of trees where the fruit was only just forming at the beginning of the winter, I have found it expedient

* It is difficult to determine the variety of the middle tree in the photograph, but Mr. F. M. Bailey, Colonial Botanist, is inclined to think it is the "Cowleyii."—Ed. "Q.A.J."

to cut the tree well down during the frosty weather, and by this means the tree gets a chance of throwing out fresh limbs at the beginning of spring, thus enabling the fruit to eventually be far enough advanced to hold its own during the following winter.

All the fruit that has already been picked were of a very good flavour, with the exception of those picked in the extreme cold weather. There was a superabundance of seed in the fruit—much more so than what was to be found in the fruit imported into Gympie.

It would be interesting if some of your correspondents would give your readers their views on the cultivation of this somewhat overlooked and neglected fruit industry—a fruit which has properties varied and approaching almost the magical—a fruit whose plant is one of the commonest, and almost a weed in North Queensland; and yet how trivial and prosaic are the honours bestowed upon it!

Regarding the best time of sowing the seed, there can be no question that the month of September is the best time for making sure of your seed coming up, and subsequent easy rearing of the young plants, but I have been very successful with seed sown at the end of February or the beginning of March, and, if great care is taken of the young plants during their first winter, I should recommend sowing during the last-mentioned period.

SUMMER PRUNING.

By C. ROSS, Instructor in Fruit Culture.

It is somewhat difficult to teach correct principles in a short article and at the same time to be explicit, but the following remarks are made as concise as possible.

Summer pruning consists of removing and shortening superfluous shoots whilst the tree is in active growth. Most deciduous trees produce more young shoots and blossoms on their branches than can be properly developed. Therefore, for the purpose of producing more fertile branches and better fruit, disbudding is resorted to. What is termed disbudding, or thumb pruning, is performed in spring and early summer, and simply means the removal by the finger and thumb of crowded and misplaced buds or shoots. As the growing season proceeds, occasional vigorous shoots will arrive and threaten to upset the balance of the tree by outgrowing the rest. If such shoots receive a temporary check by pruning away a part of their extremities the flow of sap will be diverted to the weaker parts, so equalising vegetative activity and preserving the proper balance of the tree. Strictly speaking, summer pruning, in the case of apples and pears, is performed in late summer or autumn, just before the flow of sap has ceased. Starting earlier only induces secondary growth which has to be removed, but dominant shoots may be pinched back from time to time. If properly carried out, winter pruning, to a large extent, may be dispensed with. At this season it is impossible to mistake the difference between a fruit bud and a wood bud in the apple and pear, whereas in winter nothing is more difficult for the amateur than to be able to distinguish between them. The fruit buds are short, thick, and blunt at the end and surrounded by a worl of leaves. The wood bud is long, thin, and tapering.

The previous year's shoots should be properly spaced by disbudding or thinning out with the knife, preserving those carrying fruit buds or spurs. Wood buds on the main branches are usually very numerous, and are produced in clusters round the blossom buds. These, in the first

instance, should be reduced, and subsequently, if a tendency to overcrowding is observed, be further suppressed. Shoots from the wood buds retained should be allowed to grow freely until they have attained their full length (about February or March), when they should be cut back to seven or eight buds of the base. Terminal shoots (leaders) and those required to fill vacant spaces must be retained at their full length to be treated at the winter pruning. All subsequent shoots that may form should be stopped at the fifth or sixth leaf, and in consequence the sap will be forced back, settle in, and develop the fruit buds nearer the base, where the fruit is most desired, also expose the tree and its crop to more light and air.

In the case of a top bud of a last year's shoot growing strongly, and one or more weaker buds in a better position for forming a future branch lower down, the top shoot should be persistently pinched back to allow the belated buds to overtake it.

Apricot trees in spring should have the superabundant buds and shoots rubbed out, leaving the remainder properly spaced and the points of sappy growths pinched out. Shoots that are present in the centre of the tree, after the crop has been gathered, are then cut back to 9 or 10 in. Any growths that may arise from the retained portions of these shoots will ripen into fruit-bearing wood. All shoots that are crossing each other should be suppressed. Leaders that are retained after thinning out may be left to grow, but the over-robust ones should be shortened.

The summer treatment of plums consists of pinching back the extra strong shoots and shortening and thinning out the laterals. Where leaders show signs of overcrowding, a number of them should be entirely suppressed or cut back to form fruiting spurs for the next year's crop.

The young shoots of peach trees should be evenly spaced by disbudding in spring to give regularity and an equal diffusion of sap. Were all the shoots proceeding from the main branches retained, they would be imperfectly matured, and fully developed buds would only show at the terminal points, but, by the admission of abundance of light into the interior, this condition of things is altered, insomuch that plump fruit buds will be developed nearer the base of the shoots.. As the summer proceeds, overcrowding should be relieved by thinning out, and over-vigorous leaders checked by pinching the extremities. Severe winter pruning frequently causes an excessive number of shoots the following spring; it is therefore essential that the leaders be thinned out before the sap has quite ceased to flow in summer, and the side shoots thinned and shortened to induce the elaboration of the returning sap in the lower buds. This general shortening of summer shoots should not be performed too early, for in that case the fruit buds would burst into lateral growth and spoil the issue aimed at—that of the production of good fruit.

Summer Treatment of Citrus Fruits.

The fallacious notion that evergreen trees require no pruning has been a cause of many orchards being gradually reduced to an unprofitable and diseased condition. If pruning is necessary for deciduous trees, how much more so is it the case for the development of buds, shoots, and fruit on citrus trees that exclude light and air all the year round? Deciduous trees are usually pruned in winter when at rest and denuded of foliage, whereas evergreens are pruned when the sap is rising in spring and while the tree is in a state of vegetative activity, therefore, to a large extent their treatment comes under the heading of summer pruning. Intelligent culture and the pruner's art comes more particularly into

requisition when we consider the inaccessibility of parasitical fungoids and insects on unpruned and neglected evergreen trees.

Oranges and *Mandarins.*—Supposing a young tree to have become well established, with the centre leader cut out, and a framework of four main arms and a stem not more than 2 ft. in height, proceed as follows:—Maintain the four leaders as near as possible at equal distances. The side shoots proceeding therefrom and growing in the desired direction should be encouraged until strong enough to dispense with the centre leader, which is now cut out. We now have two leaders in place of one, which lays the foundation of a secondary system of arms. Overcrowding must be avoided by pruning away watery shoots, and such as are striking in an horizontal direction across the tree. Terminal shoots often bud out in thick clusters; if all these were allowed to grow, some would perish by natural decline, or produce weak growth, dense foliage, and provide congenial harbourage for pests. Thin out such shoots to three, two, or one, as the case may be, leaving sufficient space between. Where a fruit has been borne, the old fruit stem should be cut right away to give room for the new growth. The interior of bearing trees should be kept free and open and all suckers and water shoots suppressed.

Lemon.—The characteristics of the lemon are considerably different to the orange, but the treatment during the first stages are similar. The orange only bears its fruit on the terminal twigs, *i.e.*, on the outside of the tree, whereas the lemon is born on the laterals all along the side limbs. As growth proceeds, the side limbs assume a more horizontal position, and the consequence is that much sappy growth is produced on their upper surface, which, if left, would be a long time coming into fruitfulness. Most of these shoots should be rubbed out, retaining only those required to fill vacant space, but none of the underside twigs should be so treated, as they are the main fruit producers. The lemon is a more rampant grower, consequently does not require so much thinning as the orange; it is more a matter of training to obtain a symmetrical tree.

TENDERS FOR SUPPLIES OF FRESH VEGETABLES FOR THE UNITED STATES ARMY IN THE PHILIPPINES.

The Department of Agriculture and Stock has received advice that from time to time tenders are being called for large supplies of fresh vegetables which are required for the use of the United States Army in the Philippines.

The requirements generally run into about 600,000 lb. of potatoes and 120,000 lb. of onions per month.

As the time for the receipt of tenders is generally rather short the British Consul-General at Manila, advises that intending bidders might have to arrange telegraphically, to do which they would require some firm to act as their agents, and he has supplied the names of three firms who might be willing to act, and from whom all particulars could be obtained.

They are:—

Messrs. Castle Bros., Wolf and Sons, Plaza Moraga, Manila.
Messrs. Hashim and Co., Escolta, Manila.
Messrs. Stevenson and Co., Muelle del Rey, Manila.

Tropical Industries.

CONCERNING THE PURCHASE OF AN IMPROVED FARM.

By A. J. GIBSON, Ph.D., M.A.,
General Superintendent, Bureau of Sugar Experiment Stations.

Many prospective farmers do not care to undertake the arduous tasks of pioneering new country. They look at a piece of improved land and consider that a quicker return on the capital invested is to be obtained, without undergoing the hardships of pioneering.

In a previous article on "Hints to Prospective Farmers," attention was drawn to the importance of choice of locality, &c., and these remarks apply equally to improved lands.

In selecting such lands, it is of the utmost importance to arrive, as near as possible, at their capabilities as crop producers. In determining this factor it is necessary to know what crop or crops have been grown upon the land over a period of years, or whether the crop has been a continuous one, and whether a systematic rotation and fallowing have been the practice of the owner.

A careful examination of the farm should be made to ascertain the full properties of it; whether scrub or forest, highlands or lowlands, broken, flat, or undulating. The facilities for drainage and carrying off surplus water in very wet times should also be inquired into, as well as the capabilities of the soil for retaining moisture during dry spells.

The nature and depth of the soil, as well as the subsoil, are matters of great moment to the farmer. A shallow soil is of not much use for cane-growing, as it does not allow of subsoiling. Some soils are of a stiff, clayey nature, and are very difficult to work. They can only be worked at certain times, which experience the farmer must acquire. Others work very freely, and it is nearly always possible to get a good tilth. The alluvial soils, in particular, are usually easily worked, and good tilth is obtained. This factor has a marked bearing upon the strength required for the cultivation of the land. Much can be done to improve the mechanical condition of the soil, and the good farmer is ever on the alert to bring about this end. It can be done by planting deep-rooted crops, which penetrate and loosen up the subsoil. All organic matter possible is turned under and allowed to decay. Soil, rich in organic matter, retains moisture much better than others poor in this element. The writer has seen comparatively poor soils considerably enriched by this process, whereas, on the other hand, he has seen soils which were once rich in this element greatly impoverished through neglecting this essential farming principle.

On older lands, it is, therefore, necessary to know what has been done in the above direction, in order to assist the prospective purchaser to arrive at a true valuation of the land.

On some lands there are a number of grasses which make cultivation very expensive, and they are very difficult to exterminate. Couch grass is hard to get rid of, while it is almost impossible to remove permanently nut and Johnstone grasses. The spread of these latter grasses is a very serious matter, and frequently good lands have been allowed to be overrun through neglect and carelessness on the part of farmers. There is a difficulty in getting the plant away in nut-grass-infested lands, however, when a good strike is obtained, the cane plant can thrive well.

Nut grass is to be found chiefly upon river-bank lands. These lands are much used on account of their richness, and are largely availed of for cane-growing purposes. The great essential in lands of this class is to work them thoroughly and use judgment in the planting season.

It is well, therefore, to know what difficulties have to be overcome in the above direction, before entering upon the venture.

Further inquiries should be made into the general state of the farm. Get some idea of the value of the work done towards the next year's crop, and what it will cost to put the fallow land under crop. Estimate the value of the rooted crop in the ground. In this case it is necessary to learn whether the crop is a plant, first, second, or more ratoons. In fixing this point, the general appearance of the crop must be taken into account; care must be taken to see that it is free from disease or attacks of insect pests. It is desirable to form an opinion of what capital should be expended on the crop, and what will be the probable return, under seasonable conditions. The remaining improvements should be thoroughly overhauled; the state of the fences surrounding the property, paddocking accommodation, with the usual farmyard conveniences, live stock, farm implements, tools, and rolling stock, together with all buildings, should be well examined. The value of cane per ton at the nearest mill should also be ascertained.

After the foregoing subjects have been carefully gone into, the prospective purchaser should be in a position to arrive very closely at the value of the farm under offer.

It is impossible to obtain all the ideal conditions in any one farm, and the object of this article is more particularly to throw out hints to those who have not the experience and who need enlightenment upon this important subject.

Naturally, the personal element enters very largely into the question of successful farming. One man, farming on comparatively poor land, will get good results, while his neighbour on a similar class of soil is making failure. Many people pay too much for improved farms. The true value of agricultural lands can only be arrived at by taking their capacity to produce and the net value of the products obtained (under good farming conditions and varying climatic influences) over a period of years.

In making these calculations, due regard must also be given to the original capital cost of clearing land, interest on capital invested, maintenance and depreciation on working plant, together with value of improvements and extensions over the period under review. It does not follow that all monies spent on the land can be charged as an improvement. It is very essential for the farmer to be able to calculate the cost of things. Many of the failures in farming would be avoided if farmers knew how to reckon the cost of different operations.

In many cases it will be very difficult to get accurate detailed costs, and the inexperienced man will have to rely upon the best advice procurable, and more particularly use his own judgment.

There may be a number of farms in the same locality open for sale, and by making comparisons and careful inquiries a very near value can be obtained. It is not a wise thing for an inexperienced person to commence farming on older lands. It is best to acquire some practical knowledge of farming methods before undertaking the risks. Farmers on older lands must be well versed in the art of soil tillage, manuring, &c., if they wish to succeed.

NEUTRALISING THE PUNGENCY OF GINGER.

In March last the Agent General for Queensland in London was, at the instance of the Department of Agriculture and Stock, requested by the Chief Secretary to obtain full information relative to the methods in vogue in China for the purpose of neutralising the pungency in ginger intended for use as desert (preserved ginger). A request was also made for rhizomes for planting purposes, of special varieties.

On receipt of this application from the Chief Secretary, the Colonial Secretary, Hongkong, courteously supplied full information as follows:—

PRESERVING GINGER.

"The ginger is washed and the skin is scraped off. It is then punched with forks and washed in rice water (the water left after washing rice), to improve the colour. It is then boiled in three or four changes of refined sugar and water for one or two hours until it is properly soaked, and then put in barrels and covered with syrup.

In the case of dry preserved ginger, the wet ginger is strained till dry; dry sugar is placed on bamboo matting, and the ginger is rolled in it till it is coated with the sugar.

Stem ginger is the young and tender shoots on the roots. Cargo ginger is what is left after cutting off the 'stems.'"

Further information on the cultivation pursued for the production of the least pungent kind of ginger, is supplied by Mr. M. W. T. Tucher, Superintendent of the Botanical and Forestry Department, Hongkong. Mr. Tucher writes:—"All Chinese ginger is less pungent than the Jamaican variety, but whether the pungency is due to cultivation or to a variety of the plant, I am unable to say."

CHINESE METHOD OF CULTIVATING GINGER.

The method adopted by the Chinese in cultivating this plant, I am informed, is as follows:—

The rhizomes are planted in the spring in ridges about 1 ft. high and 2 ft. apart. The rhizomes are set in the ridges about 6 in. apart.

Low-lying ground is generally selected, and water is kept continually between the ridges.

When the young shoots are from 6 in. to 1 ft. above the ground, the plants are heavily manured with urine or nightsoil mixed with water. This is repeated at frequent intervals.

About three months after planting, the first crop of ginger is ready, This is known as "young ginger," and is the least pungent and the most expensive.

If the rhizomes are allowed to mature, which will be between October and December, they become more pungent, but nothing like the Jamaican.

Old rhizomes are used for replanting in the spring. When the present year's rhizomes are matured, which will be in the autumn (October in Hongkong), I will send you a consignment for planting.

The method of preserving ginger as explained by Mr. Tucher has been given above.

Articles on the cultivation and preserving of ginger have appeared in the "Queensland Agricultural Journal" in October, 1898, p. 297; December, 1900, p. 545; November, 1902, p. 354; April, 1906, p. 451; November, 1909, p. 268.

A light sandy loam is considered the most suitable for ginger.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

Order CRUCIFERÆ.

BRASSICA, Linn.

B. campestris, *Linn.*, subspecies **Napus**, *Linn.* The Rape. Yields the Cole seed; yields colza oil. Root fusiform, leaves glabrous and glaucous, petals deciduous before the corymbs lengthen. This plant is frequently met with as a stray from cultivation in the southern parts of the State.

Order CARYOPHYLLEÆ.

TRIBE SILENEÆ.

DIANTHUS, Linn.

Calyx tubular, 5-toothed, finely striated (with 7 to 9 or 11 nerves to each tooth); base embraced by 2 or more imbricating bracts. Petals with a long claw; blade entire or toothed or fimbriate, claw without a scale. Stamens 10. Disk a long-stalked gynophore. Ovary 1-celled; styles 2. Capsule cylindric-oblong or ovoid, 4-toothed or valved. Seeds orbicular or discoid, plane or concave, imbricated on the columnar placenta; embryo straight, excentric. Herbs, usually perennial. Leaves linear. Flowers terminal, solitary or in paniculate cymes. The species distributed over the temperate parts of the globe.

D. prolifer, *Linn.* The Proliferous Pink. A stiff, erect, wiry, glabrous annual, simple or with a few erect branches, 6 to 12 in. high. Leaves few, narrow, erect. Flowers small, in compact oblong or ovoid terminal heads, the calyx quite concealed by broad, dry, shining, almost scarious, imbricate scales, from the top of which appear the small spreading pink petals

Hab.: This weedy plant is a native of England, but has become during the past few years naturalised around Toowoomba, *H. A. Longmann.*

Order RUTACEÆ.

BORONIA, Sm.

B. pinnata, var. alba, *Bail.* This pretty white variety has lately again been met with on the Islands of Moreton Bay by Mr. H. Tryon, but as it seems hitherto to have escaped being recorded it is here given. It only differs from the normal form in its pure white flowers.

Order FUNGI.

FAMILY HYMENOMYCETES.

The following plants of this Order, with the exception of the Aseröe, have been determined for me by Mr. G. Massee, of Kew, England :—

AGARICUS, Linn.

Subgenus Lepiota.

A. gracilentus, *Kromb.* Edible. Stem hollow, and slightly bulbous, ring free, thin, 5-6 in. long, 4-5 lines thick, obsoletely scaly. Pileus rather fleshy, at first ovate, then campanulate, and at length flattened, spotted with brownish scales; gills remote, broad, pallid.—Cooke's British Fungi.

Hab.: Oxley, *D. O'Connor.*

A. aureus, *Mass., sp. nov.*

Hab.: In a horse-yard, Brisbane, *C. T. White.*

Subgenus Tricholoma.

A. sordidus, *Fries.* Pileus 6 cm. broad, tough, subcarnose, campanulate-convex, depressed, subumbonate, glabrous, appearing moist. Margins at length striate. Stem about 6 cm., stuffed, fibrilloso-striate, subincurved, thickened at the base; gills rounded, subcrowded, light-violet or sooty-coloured, at length sinuate-decurrent. Spores ellipsoid, 7-9 by 3, 5-4 μ, muricate.

Hab.: Amongst grass, Brisbane River, *C. T. White.*

Subgenus Psalliota.

A. sylvaticus, *Schæff.* The Woods Mushroom. Pileus fleshy, thin, campanulate, then expanded (8 cm. broad), gibbous, fibrillose, or squamulose; ring simple, distant, stem hollow, unequal, whitish (8 cm. long, 1¼ cm. thick); gills free, crowded, rather thin, dry, reddish, then brown. Spores 6-8 by 4 μ.

Hab.: At the stem of a shrub in Brisbane Botanic Gardens, *F.M.B.*

PANUS, Fries.

P. conchatus, *Fries.* Luminous. Pileus fleshy, tough, thin, unequal, excentric and dimidiate (2-4 in.), cinnamon, becoming pale, at length squamulose; stem short (½ in. long), unequal, pubescent at the base; gills forming decurrent lines on the stem, somewhat branched, whitish, flesh-coloured, then ochraceous.

Hab.: Eumundi, *J. F. Bailey and C. T. White.*

FOMES, Fries.

A.—Mesopodes.

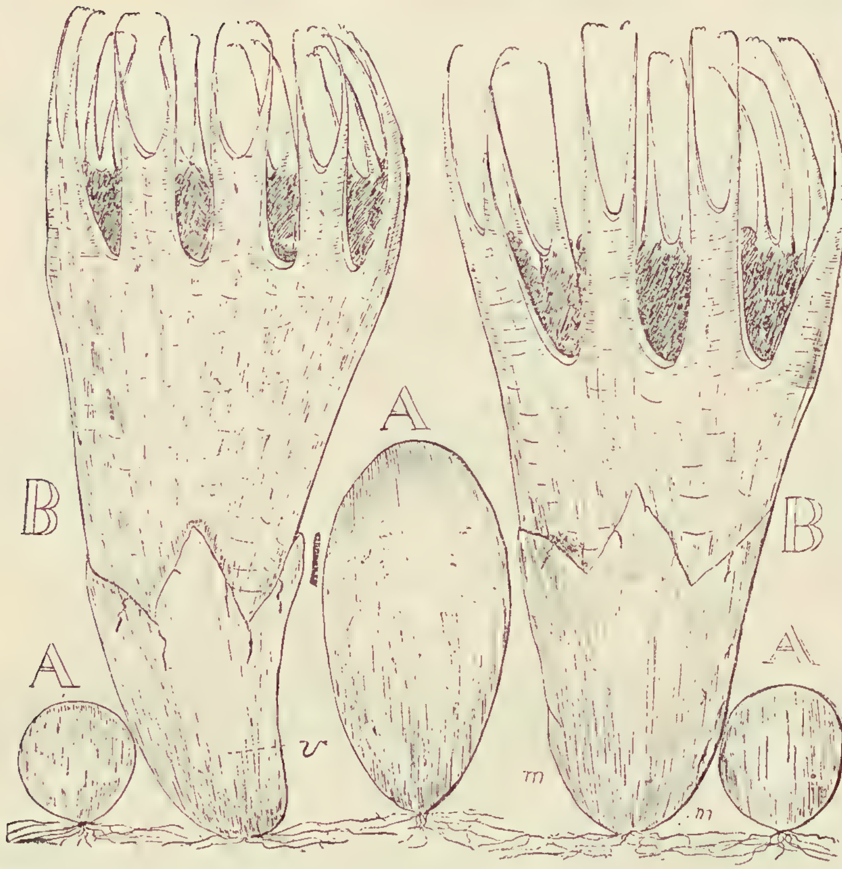
F. rudis, *Berk.*, Fl. Tasm. Stem subcentral (2-6 cm. long), rooting in the wood, equal, brown, covered with a tawny pruinosity, these shining; pileus convex, rather depressed in the centre, orbicular, brown, pruinose like the stem, or minutely velvety, rugose (8-12 cm. diam.); margins obtuse; pores brown, subrotund, of medium size, substance pallid, soft and spongy.—Cooke's Handbook of Austr. Fungi.

Hab.: Brisbane River, *S. J. B. Skertchley and C. T. White.*

Family Phalloidei.

ASERÖE, Labill.

A. poculiforma, *Bail.*, Ql. Agri. Journ., xxv. 165. Further specimens having been received of this unique plant, additional figures are here given to show the deviation in form of plant in the egg-stage, and also in the number of receptacle-limbs, which seem to vary from 7 to 11. The plant seems to grow in dense masses. I am indebted for my present specimens to Mr. R. A. Wright, of Toowong.



C.T.W., *del.*

FORMS OF ASERÖE POCULIFORMA, *Bail.*
A. Young plants. B. Mature plants. *v.* Valva. *m.* Mycelium.

FAMILY MELANCONIÆI.

HAINESIA, Ell. et Sacc.

Acervuli or pustules under the cuticle, soon bursting through and forming small cushions on the leaves, of pretty colours, often yellowish-red, and subtremelloid. Conidia oblong or sausage-shaped, continuous, hyaline, basidia filiform, often in branching fascicles acropleurogenous.—Saccardo Sylloge Fungorum, iii. 698.

H. aurantiaca, *Mass.* Acervuli scattered, scarcely pulvinate, small, 0·5-1 mm. diam., often confluent, of a pleasing orange colour, becoming pale. Sporulæ elliptic on both sides, ultimately roundish, hyaline, often curved, 10-12 x 3·5 μ, sterigmata arising from the brown proliferous strata, filiform, hyaline, solitary.

Hab.: Tambourine Mountain, *J. H. Simmonds.* On fruit of *Endiandra insignis*, Bail.

Order ALGÆ.

The two following Algæ have been determined by Mr. A. D. Cotton, of Kew, England:—

CLADOPHORA, Kuetz.

C. fusca, *Martins*, De Toni Syll. Alg., i. 311.

Hab.: Southport, *F. M. Bailey, Jr.*

PERITHALIA, J. Ag., De Toni Syll. Alg., iii. 377.

P. inermis, *R. Br.*, De Toni Syll. Alg., iii. 378.

Hab.: Mooloolah Heads, *C. T. White.*

Vegetable Pathology.

PRICKLY PEAR (OPUNTIA)—ALLEGED DESTRUCTION BY INSECTS.

The Government Entomologist and Vegetable Pathologist to the Department of Agriculture and Stock, Mr. H. Tryon, who lately visited Roma to investigate the reported destruction of prickly pear by insects, has furnished the following report—dated 11th October, 1911—on his inquiries to the Under Secretary:—

I have the honour to inform you that, in compliance with instructions, I visited Roma on Wednesday, 4th October, for the purpose of inquiring into an instance of reported prickly pear destruction by insect agency that had been brought under notice by Mr. Donald Ross as occurring at Bungeworgorai and some six miles therefrom.

In pursuance of this investigation, I accompanied Mr. Ross and others to the spot indicated by him as exhibiting the special prickly pear fatality to which he had adverted.

I at once intimated that it was one liable to inundation, and that water had some time since partly covered it, and the prickly pear plants growing thereon; a conclusion that Mr. Ross was in a position to verify.

The latter then pointed out a number of prickly pear plants covering this area that had evidently ceased to grow, and were, moreover, in some cases already partly dead; and extirpating several of these, he pointed out (1) that the bases of the stems of these had undergone a process of wet decay, resulting in the presence of a brown putaceous substance, that seemed to have eroded the sound, healthy tissue, and that (2) this substance contained insects ("grubs") that apparently had given rise to its presence and to the consequent decadence of the prickly pear plants attendant thereupon.

These grub-like insects I found to be the larvæ, or maggots, of certain flies of more than one kind; and, that they were not ones that, in any of their stages of growth, attacked healthy and growing plant-tissue; but were insects that were associated with such as had already commenced to decay independently of their presence.

I also found that the flies whose maggots occurred in this connection were included amongst those that the decaying portions of the prickly pear were still attracting at the time of our visit, and examples of which were captured there by me or at my instigation.

These fly-maggots were principally representatives of the early stages of growth of species of *Seria* (*Syrphidæ*); *Neocxaireta* (*Stratiomyidae*); *Calliphora, Lucilia,* and *Muscina* (*Muscidae*): the first two of these apparently predominating.

In some cases, apparently as the outcome of the voracity of these fly-maggots, the wet, broken-down, and discoloured tissue had disappeared, leaving in its place a cavity and a few woody fibres.

In explanation of the phenomena alluded to, it was found that a disease was present, that commencing at the extremities of the roots had proceeded along their course until it reached the bulbous stem base, and that the decaying tissue present was the outcome of its attacks.

And that this disease was due to a parasitic fungus—apparently one, a species of Pythium, that the writer had previously found to occur pathogenically under the circumstances, the special malady being one that he had already described under the term "Sleeping Sickness."

In other words, that the degradation and decay of the plant's tissue was primary, and that its condition had determined the presence of the fly-maggot, and not they it.

In confirmation of this, roots were taken up that exhibited the death and decay referred to, to an extent that fell short of their points of origin in the base of the stem, and then no insects were associated with the rotten tissue present under the circumstances, it being evidently inaccessible to them. Also it was shown, too, that the breaking down and discolouration of the tissue in the main stem, when it had involved this, was proceeding; whilst as yet fly-maggots had not taken up their abode in it. And, again, that although the healthy parts of the prickly pear plants might be mechanically injured, as by slashing, the exposed unaltered tissue had no influence in attracting the flies in question, much less parts whose surfaces were still intact.

An important fact that this instance of the occurrence of the disease "Sleeping Sickness" brought under notice by Mr. Donald Ross, demonstrated, was, that evidently under certain soil conditions there was a possibility of its being communicated through the earth from plant to plant by water, as might happen when it once occurred in connection with prickly pear plants growing on land liable to inundation, as were the ones whose unhealthy state is now under consideration. For previous observations have shown that it does not become spontaneously disseminated under ordinary conditions, where such inundation does not occur; failing even to become communicated to plants growing independently under ones subject to its attack.

Mr. Ross deserves great credit for bringing the matter under public notice. Since the conclusion that the disease was due to insects, and, therefore, one possible of being widely disseminated, is a conclusion that an observer lacking special technical knowledge would very naturally form, although not every such observer might desire, as did he, that such conclusion be reviewed in the light of more exact knowledge before any proposal based on its presumed correctness were definitely propounded.

Special obligations are due to Mr. P. A. Ryan, of Roma, for providing the conveyance of the writer to and from the scene of his investigations.

Owing to the great public interest attaching to this inquiry, the conclusions arrived at have been already made known to the "Western Star," and published in its edition of the 7th instant.

A POTATO BLIGHT PREVENTIVE.

A good blight preventive in potatoes is made (says a New Zealand paper) by dissolving in 25 gallons of water 6 lb. of sulphate of ammonia and 6 lb. of nitrate of potash—approximately, 4 oz. of each to a gallon of water—in which the potatoes should be soaked for 24 hours, and afterwards allowed to dry for 24 hours before planting. The specific may be used for other seeds. A New Zealand farmer who has been using the preventive for the past five years claims that his potato crops have been wonderfully free from blight.

Entomology.

INSECTS AND PLANTS.

By P. B. GREGSON, Member of the American Association of Economic Entomologists.

Everywhere around us there is a continual warfare going on among plants as to which shall keep their ground, for plants are fighting against each other all the time for space, soil, light, and food. We can understand how it is that plants have to struggle so among themselves when we remember that each produces, as a rule, a vast number of seeds—some, like the poppy, producing many thousands on a single stem; and the world would in a very few years be full of poppies were it not that other plants are competing with them for space and food, and thus keeping the poppies from taking up more than their fair share of room.

Then, besides these other competing plants, there are all the plant-eating animals, which eat plants in every stage; and the birds, which eat the buds and seeds; and the frost, which kills off whole multitudes of plants; and drought, floods, &c.

But plants of all kinds, from the great oaks and elms down to the smallest weed, have hosts of insect enemies also, against which they are perpetually struggling; and there are as many different kinds of insect enemies as there are kinds of plants, and as a general rule each kind of plant has its own particular kind of insect to fight against. For instance, the caterpillar which injures our fruit trees will not eat the potato, and the wireworm which eats the potato will not touch the gooseberry, nor will the beetle which strips off the potato-haulm molest the wheat, and so on.

Most insects lay eggs which hatch into grubs or caterpillars, and the chief damage which is done to plants is done by the grubs or caterpillars of beetles or moths. The average moth will lay about 300 eggs, and this would give in three years (if unchecked) more than a thousand million caterpillars; and there are thousands of other insects which would all multiply just as rapidly unless checked.

Insects attack plants in every possible way—neither leaves, roots, seeds, pith, nor the solid wood being immune. There is a little midge which lays its eggs in the flower of clover, and the eggs hatch into little grubs which eat up the forming seed. Beetles lay eggs like other insects, and the gardener often finds inside green peas a little grub making his home there. A little beetle has climbed up the pea-vine and laid its eggs in the pod, and the grub hatches out and discovers the green-pea close by ready for his food. Maize, or Indian corn, has every year to contend against larger beetles, which lay their eggs at the root of the plant for the grubs to eat when they hatch.

Caterpillars also attack the ear of corn. In the United States both corn and wheat have another very injurious insect to fight against, and this insect alone causes a loss to the farmers of about £12,000,000.

Another great enemy which wheat has is the "army-worm," the moth of which lays more than a thousand eggs, and causes sudden and overwhelming attacks on the wheat and cornfields by myriads of these caterpillars.

In England, during 1909, the apple crop suffered extensively from caterpillars; many trees were stripped of leaves and much fruit damaged

or destroyed. Occasionally in Michigan whole forests of oak, elm, and maple are stripped just as if winter had come, and large areas of fir and pine are injured by beetles in the timber regions.

In the cotton States the caterpillar known as the boll-worm attacks the cotton, and often causes losses amounting to many millions of dollars; and even cured tobacco does not wholly escape, for there is a beetle which is a great lover of tobacco in all its forms, and its grub relishes it, either in cigarette, cigar, or cut leaf, almost equally well, and of course ruins it for the human user. It is estimated that in the United States one-tenth of the entire crop of every kind is lost by the ravages of insects. This means that in a single year, in that country alone, insects cause a loss to the farmers and manufacturers of £75,000,000.

In the State of Maine a caterpillar called the forest tent-caterpillar (because it makes a web like a tent over the branches of trees) collects sometimes in such vast numbers that a band of them 11 miles in breadth has been known to march through the country, devastating every tree and plant like locusts.

We see, then, how severe the struggle is in which plant-life is perpetually engaged for very existence, and it would seem as if vegetation must be in danger of being exterminated. But Nature has devised ways of preventing the plant-feeding insects from obtaining full control of plant-life by providing enemies of various kinds for them. Chief among these enemies are other insects themselves. There is the grub of a very abundant little fly whose natural food is this very same forest tent-caterpillar and the army-worm. The fly lays its eggs within or attached to the body of the living caterpillar, and presently the little grubs hatch and slowly consume the inside of the caterpillar till it dies. Immense numbers die in this way in a season. Frogs and birds also are very active insect-eaters.

The potter-wasp, an insect rather smaller than the common brown wasp, is extremely partial to the canker-worm, which is a caterpillar that attacks our apple and pear trees. This wasp fills her cells with canker-worms as food for her young. There is also a very minute four-winged fly which actually pierces the egg of the canker-worm moth, and therein lays one of its own eggs, which in due time hatches within the canker-worm egg, the shell of which, though only one-thirtieth of an inch long, serves for its habitation and the contents for its food.

In 1889 the orange and lemon crop of Southern California was threatened with extinction owing to the ravages of the fluted scale insect, *Icerya purchasi*. This insect was accidentally imported into the country, and increased abnormally because of the fact that its enemies were not brought in with it. The finest orange and lemon groves became almost worthless, and ruin stared the growers in the face. A little black-and-red ladybird (*Vedalia cardinalis*) was found to feed upon the insect in its native country of Australia, and it was introduced into California. It recognised the fluted scale insect as its prey, and devoted itself entirely to that species, totally suppressing it in a short time.

Frost also kills off multitudes of insects every year; and, as if by a kind of retributive justice, there are several kinds of plants which themselves eat insects. All vegetation must have various materials for its support, in addition to air and water. It needs nitrogen, phosphorus, sulphur, &c., and it generally gets from the soil the nourishment it thus requires; but in very boggy soils there is often a lack of these materials, and so there are plants existing which actually eat insects in order to get nourishment from them. The pretty little English sundew is an insect-eater. It has round leaves thickly covered with small red hairs which are

very sticky, and when a fly alights on the leaf, attracted by the smell of the sticky fluid, he is caught and held by the gummy mass, and the hairs on the leaf close up round him, and soon the leaf has sucked the poor victim's body dry to provide its own nourishment.

Another instance is the common English teasel. The leaves of the teasel grow opposite one another, and form between them a sort of cup or basin which will hold water. If you look close into this you will find that it is often full of dead midges, flies, ants, &c. The water is both a trap and a solvent; the insects are first drowned and then decay, and the plant puts forth long threads into the water and derives its needed food. In the Western Hemisphere there are many other insect-eating plants.

We see, then, first a constant threatening by the vegetable world to overrun the earth, and then its danger of extermination by the animal world; while all the time checks and counter-checks are at work to keep each race within due bounds. This is called the balance of Nature; and when the farmer does anything which alters this balance, as by growing a crop on which particularly destructive insects feed—such as wheat or Indian corn—then we find that that particular kind of insect, by being thus encouraged, outmatches the other insects and things which keep it in check in its natural state, and then it is that artificial remedies (such poisons or variation of the crop) have to be adopted to aid the farmer to fight it, and most Governments have established bureaus where entomologists study the best remedies to apply. It is not within the scope of this sketch to explain the various devices adopted, such as spraying with arsenites or emulsions or fumigating with gas for leaf-eating insects, injecting bisulphide of carbon into the soil for root-eating insects, &c.; but one instance may be mentioned as showing the attentive watchfulness

Every year the cotton crop is liable to immense damage in the Southern States from the boll-worm, which bores into cotton-bolls. This species is one of the most difficult of insects to deal with directly, from its habit of feeding concealed in such a way that in most cases the application of arsenites is a practical impossibility. It was found that Indian corn was the favourite food, and they will attack it in preference to everything else. This preference is taken advantage of by cotton-growers, who plant Indian corn in cotton-fields at such a time that the ears will be in an attractive condition precisely when the moths would otherwise lay their eggs in the cotton-bolls. In 1887 (before the adoption of this practice) an estimate was made of the loss caused to cotton-growers by this insect, and it was stated to be 60,000,000 dollars in that one year.

Leaving now this struggle of plants and insects, we may turn with a feeling of relief to a happier phase in their lives. Most plants depend entirely on the help of insects to enable them to produce seeds, and the kind office performed by these insects (though unwittingly) more than compensates plants for the damage done by other insects, for without seeds plant-life would soon disappear. Let us see how insects help. Suppose we take a geranium blossom for the purpose and examine it carefully. We find in the very centre of the blossom a tall spike, which is called the pistil. If we touch the top of the pistil gently with our finger we notice it is a little sticky. On examining the blossom still further we find a number of slender, thread-like parts of the flower, which are called the stamens. These shed a yellow powder which is called pollen. At the lowest part of the pistil are very little knobs, which later on are seeds; but they would not swell and grow into seeds of themselves, but would wither away and come to nothing. They require some of the pollen to reach them, and the only way by which the pollen can reach them is by some of it being applied to the pistil. As soon as even one grain of it touches the top of the pistil it adheres, and instantly begins

to grow by sending out a little tube which makes its way down within the stem of the pistil until it comes in contact with the little knobs, and the moment it reaches these they quicken into life and begin to develop into good seeds. The yellow pollen powder is always produced at the top of the stamens.

And now we are in a position to understand how insects help. Plants have several ways of attracting them. Generally they have brightly coloured parts (which are called petals) surrounding the stamens. These are the "signboards," and they are painted all kinds of colours—red, yellow, blue, &c., and advertise to the insects that "here is good honey." Plants do not unfold their "signboards" till the stamens are ready to supply the pollen or the pistil is ready to receive it, and then come the insects (principal among which are the bees) to get the honey, and as the honey is always placed right down in the base of the flower they force their way down as far as they can. In squeezing into the flower they rub against the stamens and get some of the pollen upon their bodies. They then go to another flower to get more honey, and squeezing into it they touch the pistil and some of the pollen attaches to it, and, as we have seen, quickens the seeds into life. This is called pollination. Gardeners and florists often pollinate flowers themselves. They procure some of the pollen-dust from the stamens of one flower and rub it on to the top of the pistil of another freshly opened flower with the point of a penknife, and then they cover over the flower with a bag to keep insects from bringing more pollen, and of course they have to cut off all the stamens from the flower.

Plants which blossom in the evening depend on moths for carrying their pollen from blossom to blossom, and Nature has therefore provided that all night-flowering plants are white, because no other colour is seen so well in the dusk—a red or blue blossom would be almost invisible; and almost all night-flowering blossoms are heavily scented, like the jasmine, the white campion, tuberose, gardenia, &c., and this scent helps the moth to find the way to the flower when there is hardly enough light for him to see the white petals.

Flowers which do not advertise by showy "signboard" or by their scent have to be pollinated by the wind. The catkins of the hazel, birch, and walnut, and the flowers of grasses, wheat rye, Indian corn, oats, &c., all have to depend on the wind, and so what these flowers need is a prodigal quantity of pollen, and the pollen must hang out in such a way from the cup of the flower as to be easily dislodged by passing breezes. If we were to shake the staminate catkins of the hazel we should be fairly covered with the pollen dust, and so the wind blows this dust broadcast, and some of it alights on the pistils of other hazel-blossoms.

But we were talking really about what insects have to do with plants, so let us return to them. The bee is by far the most useful of all insects to plants. It is not the greed for honey that makes them so active; but at home in their nest are a host of young ones, and it is the necessity of getting food for them that keeps the bees so hard at work gathering honey. The pollen of each kind of flower is quite different from the pollen of any other kind of flower, so that if a bee rubbed the pollen of a buttercup on the pistil of a lily it would not make the lily have good seeds; but Nature does not allow such useless waste of pollen, for a bee only visits one kind of flower during the day. Suppose an apple-blossom was the first flower visited by a bee in the morning it would only visit apple blossoms during the whole of that day. This instinct has been abundantly tested.

Some flowers can only be pollinated by certain insects, because they are so shaped that other insects cannot reach the honey, which is all the

insects really want. They, of course, do not know that they are pollinating, or anything of that kind. Our common English figwort is pollinated almost exclusively by wasps. It has a curious, lurid-looking reddish-brown blossom; and, as wasps eat meat as well as fruit, the figwort, to attract them, looks as meaty as it can, and has an odour consistent with its appearance. There are other plants which can only be pollinated by the bumble-bees. The common nasturtium is one such plant, because no other insect has a probiscus of appendage and tongue long enough to reach the bottom of the spur which holds the honey. The heartsease and red Dutch clover are other flowers which are so shaped that only insects of the size and weight of the bumble-bee with its long proboscis can pollinate them, and if all the bumble-bees died out these flowers would probably wholly disappear. Every attempt to grow red clover in Australia and New Zealand failed until the bumble-bee was imported. The bees have multiplied there with wonderful rapidity, and spread over the whole of the cultivated portion of these countries, and abundance of seed is now produced as a result where before Australia and New Zealand had to import their red clover seed.

The Smyrna fig, the most esteemed of the edible varieties, can only be produced by the agency of a small insect called the Capri fig-wasp. In 1880 a number of fig-trees were introduced into California direct from Smyrna, in Asia Minor, but for ten years never bore any perfect figs, the crop dropping off before the figs began to mature. Several of these little wasps were then imported from Smyrna, and now the growing of the Smyrna fig in California has become a very successful industry.

It is not possible within the limits of a sketch such as this to give more than hints of what is going on around us in the vegetable and animal worlds; but these will serve to show that Nature is really a vast arena, with plots and counterplots of infinite variety to maintain the balance, and that with the development of plants their enemies also develop, but never beyond the amount of injury the plant can stand.—"Chambers's Journal."

ANOTHER WHITE ANT ON NEW CLEARINGS.

"Greniėr's Rubber News" has the following note, by Mr. Lewton Brain, on the occurrence of a white ant hitherto only known on tapioca plantations, and previously considered harmless:—

Some cases have recently been brought to the notice of the Department of Agriculture, F.M.S., Kuala Lumpur, in which *Termes carbonarius* has been found killing newly planted stumps by stripping them of their bark. Up to the present this has only been noticed on old tapioca estates. These termites were previously considered harmless, and it is important to find out as soon as possible how far their ravages have been noticed elsewhere. *Termes carbonarius* may be distinguished from other "white ants" or termites, as they are more correctly called, by the large size and sooty colouring of the soldiers. The soldiers of this species are of two kinds; the larger over half an inch long including the mandibles or nippers, which can inflict an unpleasant bite; the smaller, about three-eighths of an inch. The mandibles are curved upwards to the tips, and do not possess teeth between the base and the tip. The queen is as large as that of *Termes Malayanus,* attaining a length of one and three-quarter inches. These termites are often found in the same nest as *Termes sulphureus,* the little sulphur yellow species, which lives in hard-cased mounds sometimes 5 ft. high. The queen of *T. sulphureus* averages only 1¼ in. in length. *Termes sulphureus* and *carbonarius* are both described

in books as harmless, being fungus (or "mould") eaters. The fungus grows on cakes or masses of vegetable matter which are stored in special chambers in the nest.

Up to now analyses of these masses have failed to show any traces of rubber, but further samples are wanted for analysis with notes of the depth at which they are found, as those examined may only have been collected by *Termes sulphureus*. If *Termes carbonarius* makes a separate nest, it has not yet been described. The stumps are reported to be attacked at night and in the early morning after and during rainy weather. This would be a dangerous pest to young estates, but for the fact that the nest of *Termes sulphureus*, which it inhabits, is easily found on well-weeded esates, and the inmates, both *sulphureus* and *carbonarius*, can be easily killed with the fumes of arsenic and sulphur applied through the nozzle of the Universal White Ant Exterminator. Or carbon bisulphide may be poured on to a large piece of cotton-wool placed in one of the upper chambers of the nest and the hole above stopped with clay. The vapour of carbon bisulphide being heavy and very poisonous, sinks along the passages, killing all insects with which it comes in contact. A third improved method would be to find and destroy the queen and then poison the rest of the inmates of the nest.

Specimens of the various forms of this termite, preserved in spirit, and the queen chamber in the nest, as well as information about the nesting habits, distribution, and damage caused, will be most welcome if addressed to—The Director of Agriculture, F.M.S., Kuala Lumpur, Selangor.

Times of Sunrise and Sunset at Brisbane, 1911.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·4	5·33	5·29	5·47	4·59	6·5	4·46	6·28
2	6·3	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·2	5·34	5·27	5·48	4·57	6·6	4·46	6·29
4	6·0	5·35	5·26	5·49	4·57	6·7	4·46	6·30
5	5·59	5·35	5·25	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·24	5·49	4·55	6·8	4·46	6·31
7	5·57	5·36	5·23	5·50	4·54	6·9	4·46	6·32
8	5·56	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·55	5·37	5·21	5·51	4·53	6·11	4·46	6·33
10	5·54	5·38	5·20	5·52	4·53	6·11	4·47	6·34
11	5·53	5·38	5·19	5·52	4·52	6·12	4·47	6·35
12	5·52	5·38	5·18	5·53	4·51	6·13	4·47	6·35
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·51	6·14	4·47	6·37
15	5·48	5·40	5·14	5·54	4·50	6·15	4·48	6·37
16	5·47	5·40	5·13	5·55	4·50	6·16	4·48	6·38
17	5·46	5·41	5·12	5·55	4·49	6·17	4·48	6·39
18	5·45	5·41	5·11	5·56	4·49	6·18	4·49	6·39
19	5·44	5·42	5·10	5·57	4·48	6·18	4·49	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·50	6·40
21	5·41	5·42	5·8	5.58	4·48	6·20	4·50	6·41
22	5·40	5·43	5·7	5·58	4·47	6·21	4·51	6·41
23	5·39	5·43	5·6	5·59	4·47	6·22	4·51	6·42
24	5·38	5·44	5·6	6·0	4·47	6·22	4·52	6·42
25	5·36	5·44	5·5	6·0	4·47	6·23	4·52	6·43
26	5·35	5·45	5·4	6·1	4·46	6·24	4·53	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·25	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6·26	4·54	6·44
30	5·31	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	5·0	6·4	...	...	4·56	6·45

Phases of the Moon.

			H. M.
1 Sept.	☾	First Quarter	2 21 a.m.
9 ,,	○	Full Moon	1 57 ,,
16 ,,	☽	Last Quarter	3 51 ,,
22 ,,	●	New Moon	0 37 ,,
30 ,,	☾	First Quarter	9 8 p.m.
8 Oct.	○	Full Moon	2 11 p.m.
15 ,,	☽	Last Quarter	9 46 a.m.
22 ,,	●	New Moon	2 9 p.m.
30 ,,	☾	First Quarter	4 41 ,,
7 Nov.	○	Full Moon	1 48 a.m.
13 ,,	☽	Last Quarter	5 19 p.m.
21 ,,	●	New Moon	6 49 a.m.
29 ,,	☾	First Quarter	11 42 ,,
6 Dec.	○	Full Moon	0 52 p.m.
13 ,,	☽	Last Quarter	3 46 a.m.
21 ,,	●	New Moon	1 40 ,,
29 ,,	☾	First Quarter	4 47 ,,

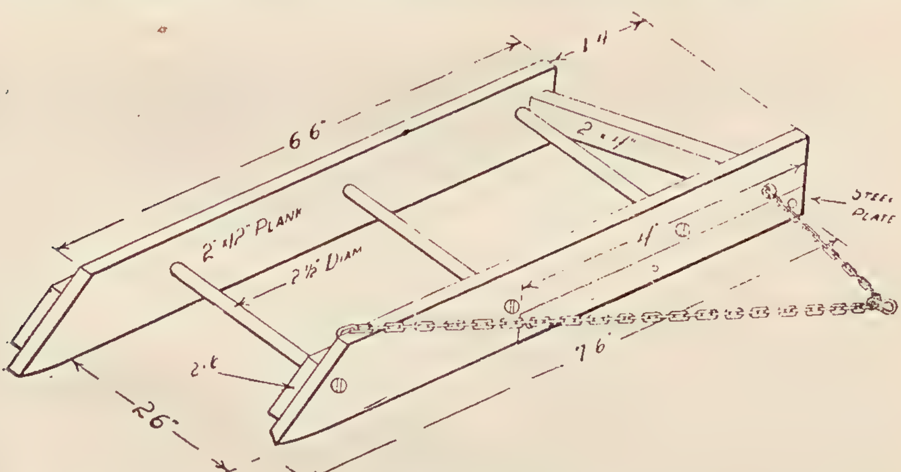
General Notes

GOOD ROADS—THE CONSTRUCTION AND USE OF THE ROAD DRAG.

With the opening up of new lands in agricultural districts, the question of roads becomes of much importance. Road-making, in black-soil country, or through scrubs and prickly-pear country, on engineering principles is an expensive business, but very good roads may be made and maintained at low cost by the use of the road drag as is done in the United States of America with signal success. In the issue of this Journal for July, 1908, will be found a description of the "Split-log Drag," by means of which, it is stated, that sound roads can be made through agricultural lands for "a mere song." Following is a reprint of Press Bulletin No. 33, issued by the University of Nebraska, U.S.A., in May, 1910, in which the drag, its construction, and method of use are clearly described. The implement would appear to be well worth a trial in districts where good roads are not. The author, Mr. L. W. Chaes, writes:—

Construction and Use of the Road Drag.

In general, Nebraska has a soil which is especially well adapted for good earth roads, and with the proper care the earth road will be more satisfactory than any other type of road construction for many years.



King road drag

The split-log drag, or, as it is commonly called, the "King" drag, is without doubt the best implement for keeping roads in shape, and in many instances is as efficient as any other implement in the construction of earth roads.

The Construction of the "King" Drag.

The King drag can be constructed of either a split log or a plank, but in this state the plank is much easier to obtain than the log, hence this brief description pertains to the construction from planks.

Select a good yellow pine, ash, or oak plank 2 in. thick, 12 in. wide, and 14 ft. long. Cut this in two at an angle so that one edge of each piece is 7 ft. and 6 in. long and the other edge is 6 ft. and 6 in. long.

Spike to the back and along the centre of each of these planks a 2-in. by 4-in. brace at the front end should start from the middle of the rear plank stakes about 26 in. apart and 4 in. from each end with a 2½ in. auger,

Fig. 1.—Road before dragging. The ruts in this road were so deep that it was impossible for the camera to show the depth of both, so a view of only one rut was taken.

using care to keep the auger perpendicular to the plank. The 2-in. by 4-in. brace at the front end should start from the middle of the rear plank and drop to the bottom part of the front plank. The blade, which is generally made of stock cutter steel, should be given the proper cutting slope by placing a wedge-shaped strip between it and the plank. One end of the chain is fastened to a cross stake and the other passes through a hole in the plank and is held in position by means of a pin.

Use of the Drag.

The use of the drag is more satisfactory if the road has first been crowned with a blade grader, but whenever this is not convenient and the traffic is not too heavy the road may be gradually brought to a crown by means of the drag.

The surface of the average country road should be covered in one round with the drag. One horse should be driven on the inside of the wheel track and the other on the outside, the drag being set, by means of the chain, so that it is running at an angle of about 45 degrees with the wheel track and working the earth toward the centre of the road. In the spring when the roads are more likely to be rutty and soft it is generally better to go over the road twice and in some places more times.

The drag should be floored with boards which are separated by open spaces of sufficient width so that the dirt which falls over will rattle through and yet they should be close enough so that the driver can move about upon the drag quite freely.

To insure the successful operation of the drag it is necessary for the driver to use careful judgment. Sometimes it is essential that the blade be held down so that the drag will cut roots and weeds, while at other times the front edge should not bear too heavily upon the surface as it

will dig out a soft place which would be better if left undisturbed. This regulation of the cutting edge can be accomplished by the driver moving back and forth or to the right and left on the drag.

Fig. 2.—The same road after having been dragged three years.

If the road is to be crowned with the drag it is often well to plough a light furrow along the sides and work this loosened dirt to the centre.

On roads with heavy traffic the drag should be used much oftener and with more care than on roads with light traffic.

The distance from the drag at which the team is hitched affects the cutting. A long hitch permits the blade to cut deeper than a short hitch, likewise a heavy double-tree will cause the cutting edge to settle deeper than a light one.

Strange as it may seem, the heavier the traffic over a properly dragged road the better the road becomes.

When to Use the Drag.

There are very few periods of the year when the use of the drag does not benefit the road, but it does the best work when the soil is moist and yet not too sticky. This is frequently within a half-day's time after a rain. When the earth is in this state it works the best, and the effects of working it are fully as beneficial as at any other time. The Nebraska soils when mixed with water and thoroughly worked become remarkably tough and impervious to rain and if compacted in this condition they become extremely hard.

This action of the soil in becoming so hard and smooth not only helps to shed the water during a rain but also greatly retards the formation of dust.

What May be Expected from the Use of the Drag.

So much has been written and said pertaining to the great benefits from the use of the road drag that many people beginning the use of it become discouraged before they are well started. They should not feel thus, as it often takes a whole season for the road to become properly puddled and baked to withstand the rains and traffic. After a road has

been worked with a drag only a short time it is not well to expect it to stand up to heavy traffic during a continued damp spell without being affected. However, it will take far heavier traffic than most earth roads receive to more than scruff up the surface. During the four years that the writer has observed the road shown in Figs. 1 and 2, only once has it ever become so soft that teams were not hauling a ton and a-half of coal in each load over it. Even in the fall of 1909, teams were delivering 3,500 lb. of coal at a load to the University Farm boiler-house before the roads became frozen.

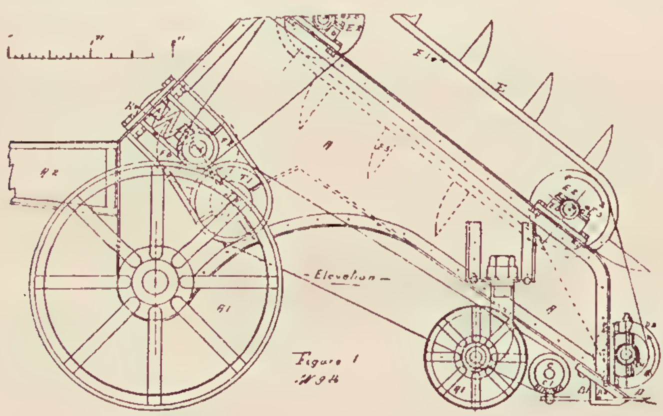
It is not well to consider the benefits from a good road as solely confined to heavy traffic, for there is no doubt but that the time saved to light vehicles and the greater pleasure derived from their use over good roads far surpasses the economy in heavy hauling.

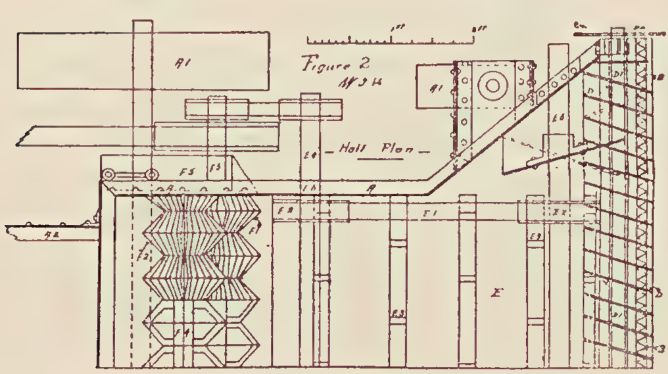
While driving over a well-crowned, smooth road the team does not have to follow the usual rut, no slacking has to be made for irregularities in the surface, and it matters not whether one or two horses are being driven.

PRICKLY PEAR ERADICATOR AND DESTROYER.

By A. MALLETT.

The illustration of the Prickly Pear Eradicator and Destroyer has, as the name implies, been designed for the purpose of bringing about in a complete manner the destruction of the pear. That the pest requires attacking in all seriousness cannot be denied, therefore, the short description herein contained may possibly be appreciated by many anxious settlers and others who are fighting, and in many instances fighting in vain, the rapid growth of the pear.





With power and strength, much can be done, and throughout the design of the machine ample strength has never been lost sight of.

Firstly, for this purpose the most reliable prime mover in the form of a traction engine has been introduced, which not only gives the power for driving the machine into the pear in any required direction, but also supplies the necessary power for the cutting, grinding, &c.

The machine proper consists of a substantial carriage, on which are mounted the various devices for dealing with the pear. The first of these is the cutter *B,* which might be described as an enlarged crosscut saw, but works after the manner of a mowing machine and at 200 strokes per minute mows the pear off close to the ground. Side cutters *D.2* are also fitted so that a definite track of sufficient width is cut so as to enable the tractor to move forward. As considerable wear is anticipated in these cutters, they have been so constructed as to be inexpensive and easily replaced. Directly over the cutter works the reducer and collector *D.* This reduces the pear to smaller pieces, and deals with the upper growths, and is also so arranged that it will remove the fallen pear clean of the cutter, and passes it to the elevator *E.* The elevator consists of arms fitted with endless chains acting as a rake; by this means the pear is drawn up a slight incline and falls into the rollers or grinders. The grinders *F.1.* and *F.2.* consist of two complete sets of chilled cast-steel serrated-edged rollers, mounted on suitable shafts. The rollers, which are conical in shape, work side by side with the apex of the one cone, fitting colsely into the reverse of the opposite cone, and revolve at a high speed inwards, but, in order to obtain a tearing action, the speeds are not equal.

The pear, after passing through, then falls to the ground in a harmless pulp.

To simply destroy the upper growth and leave the roots intact would be of little value, therefore, grubbers and ploughs are introduced to tear the roots from the ground, then are collected and passed through the grinders. Consequently, after the clearing has been effected, the land is practically ready for the farmer to sow his crops.

Much importance is placed on the necessity of saving and completely destroying the smallest particle of pear, as it is a well-known fact that, with favourable weather, a very small piece would soon take root and flourish. Therefore, the body has been so constructed that once the pear is cut, it must fall into the machine, when the only outlet is through the rollers, when, as before stated, it is reduced to a lifeless pulp.

The amount of clearing to be done in a day, of course, depends on the nature of the country, but in fairly open plain country, from five to seven acres per day could be handled irrespective of the growth of the pear, whether stunted or otherwise.

RAILWAYS AND POPULATION.

What the Canadian-Pacific Railway has done for Canada is evidenced by the fact that in 1886, when the C.P.R. was completed, there were only about 200,000 people living west of the Great Lakes. Now there must be fully 2,000,000. In the first year this company's gross earnings were 10,000,000 dollars; now they exceed 100,000,000 dollars a year, and the progress of the Canadian-Pacific fairly reflects the progress of Canada.

THE FARMER.

An old Roman officer, who lived 50 years B.C., once said:—" Of all professions, farming makes the bravest men and the sturdiest soldiers, and of all sources of gain is the surest, the most natural, and the least invidious, and those who are busy with it have the fewest bad thoughts."

NOTES ON WESTBROOK STATE FARM.

Weather conditions are pointing towards a break-up of the present dry spell, which has been the worst for some years on the Downs. All winter crops are beyond hope, except little patches of oats and wheat where the soil happens to be good, deep, and retentive of moisture. Also, where special attention has been given to the dry-farming system, a nice patch of wheat is in evidence of good cultivation on Mr. D. Rayner's farm, Westbrook.

Lucerne is very backward. Possibly one of the best small paddocks in the immediate district is on the State Farm; the lucerne is about 18 inches high, and ready to cut. There is about 3 acres, which I think would give a yield of 2 tons to the acre. The land is a stiff black soil, near the creek.

A special effort is being made to give a thorough and practical test for the cultivation of potatoes on the farm. Eight acres has been planted on two classes of soil—a stiff, fairly fertile, chocolate soil, and a loose, black, volcanic soil. The variety planted are Brownell's; 3 tons of seed potatoes were used for the 8 acres. As a preventive for disease, Irish blight, &c., the tubers were washed and soaked in a solution of formalin for two hours. The tubers were laid out to dry, and cut previous to planting. The ground was worked into splendid order, 2 cwt. superphosphate and 1½ cwt. sulphate of potassium were supplied to each acre, spread along the drills, previous to planting. After the tubers were in and the soil drilled up, 1½ cwt. nitrate of lime was added to each acre on top of the drills. All details in planting are under the direction of the Under Secretary for Agriculture. As it is well known, all potatoes degenerate after being cultivated for a few years in any country or district. There may be a few exceptions. I think from five to seven years in Queensland is the longest period that any variety of potato may be expected to succeed as a cropper, and that is with changing districts. A good deal could be done to minimise degeneration by keeping up a constant practice in selection, as in all things in Nature, both in the animal and vegetable kingdom. The mode of selection to keep or improve the existing varieties is to grow from single eyes and keep selecting the best tubers. Another method is to hybridise and select from the seedling. Great attention is being paid in the old country at present to the cultivation and improvement of the potato, and some splendid results are being obtained. An application was made last year by the Department for a selection of the new varieties from one of the largest firms in England. However, it was not thought advisable to send tubers, under the existing prevalence of potato diseases in Great Britain during 1910. A packet of selected seed was sent on instead of the tubers. The seed was sown at Westbrook on 25th August. At time of writing there are some hundreds of young seedlings transplanted into a specially prepared bed. They will be carefully watched during this season, when they are expected to make tubers about the size of marbles, which will be carefully planted next season, when special attention will be necessary in selecting the most promising. By this means we may grow and be able to select varieties more suitable for our own use than the varieties imported. Patience and perseverance will reward this class of work.

Rainfall at Westbrook for six months ending 30th September:—April, 0.55; May, 0.79; June, 0.1; July, 1.1; August, 0.54; September, 0.88; total, 3.78.

JAS. MITCHELL, Manager.

MANGE IN HORSES.

Mange in horses can be eradicated by the following treatment:—The hair over and for some distance around the affected parts should be clipped and burnt. The parts should then be thoroughly washed with soft soap and warm water, and after drying, the following dressing should be applied with a brush:—Sulphur sublimed, 1 part; linseed oil, 8 parts This should remain on for a week, and then be washed off, and the same dressing repeated. Affected horses should be isolated, and any harness or clothing used on them should be boiled, if possible.

ALIEN IMMIGRANTS IN THE UNITED STATES.

During the past ten years nearly 10,000,000 aliens have entered the United States, and something like four to six or seven millions have left. Out of last year's 1,198,000, less than 16,000 could be classified as "farmers," and only 300,000 could be called agricultural workers. The great majority of these were destined for about 100 congested cities and overcrowded labour centres of seven or eight north-eastern States. Less than 18 per cent. of last year's influx went to the thirty-six States and Territories south of the Potomac and west of the Mississippi Rivers, in spite of the efforts of private, State, and Federal distribution bureaus.

TO TAN A SNAKE SKIN.

In answer to a correspondent, the "Farmer and Settler," Sydney, says—"All you need do is to clean off any remaining flesh, oil the skin, and a little later remove the surplus oil. Here are the instructions for treating a new skin: Spread the hide out carefully, flesh side up, as soon as taken from the reptile. Mix two parts of saltpetre and alum into a fine powder, sprinkle it evenly over the surface, roll the skin up, and let it alone for a few days till the powder is dissolved. Then take off what flesh remains, peg the skin out to dry, stretch tight, put neatsfoot oil on it, and lay it up in the sun. Rub out all the oil you can with a wedge-shaped stick."

VALUE OF OLD CEDAR FENCES.

American files report that old red cedar rail fences in the State of Tennessee now furnish the world's main supply of wood for cedar pencils. So valuable are these old fences, some of which were put up nearly a century ago in districts where magnificent cedar forests once stood, that their selling price is four times as much as the cost of providing a good wire fence. In one case a farm, abandoned for agricultural purposes, was bought by a speculator for 4,700 dollars, and in three months he had sold old cedar rails from the fences for 7,200 dollars. A few farmers who possess these fences refuse to sell them because, it is said, cedar long outlasts iron.

Answers to Correspondents.

BRIGALOW FOR SHEEP.

"SETTLER," Tara—

If confined to areas where feed is scarce, or during a period of drought, sheep will eat the leaves and young twigs of brigalow, but not to the same extent as in the case of goats.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR OCTOBER.

Article.		OCTOBER. Prices.
Bacon, Pineapple	lb.	7½d. to 9d.
Bran	ton	£6 10s.
Butter, Factory	lb.	1s.
Chaff, Mixed	ton	£3 10s. to £5 10s.
Chaff, Oaten (Victorian)	,,	£5 15s.
Chaff, Lucerne	,,	£4 to £4 5s.
Chaff, Wheaten	,,	£2 10s. to £3
Cheese	lb.	7d. to 7½d.
Flour	ton	£9 5s.
Hay, Oaten (Victorian)	,,	£6 15s.
Hay, Lucerne	,,	£6 to £6 10s.
Honey	lb.	2d. to 2½d.
Maize	bush.	4s. 2d.
Oats	bush.	3s. 2d. to 3s. 6d.
Pollard	ton	£6 10s.
Potatoes (new crop)	,,	£13 10s to £14
Potatoes, Sweet	cwt.	2s. 7d.
Pumpkins	ton	£4 10s.
Wheat, Milling	bush.	4s. to 4s. 3d,
Onions	ton	£5 10s. to £6
Hams	lb.	1s. 1½d.
Eggs	doz.	7½d. to 8¾d.
Fowls	pair	3s. 5d. to 5s. 8d.
Geese	,,	7s. 6d. to 8s.
Ducks, English	,,	4s. to 4s. 8d.
Ducks, Muscovy	,,	4s. 6d. to 6s. 6d.
Turkeys (Hens)	,,	7s. 6d. to 9s.
Turkeys (Gobblers)	,,	15s. to 20s.

SOUTHERN FRUIT MARKET.

Apples (Choice), per case	6s. to 9s.
Apples (Cooking), per case	5s. to 8s.
Bananas (Queensland)—	
Cavendish, per case	8s. to 12s.
Sugar, per case	8s. to 12s.
Ladies' Fingers	8s to 12s,
Bananas (Fiji), G.M., per bunch	3s. 6d. to 9s.
Bananas (Fiji), G.M., per case	15s. 6d. to 16s.
Cocoanuts, per dozen	2s. 6d. to 2s. 9d.
Custard Apples, per tray	7s. to 10s.
Lemons (Queensland), per tray	8s. to 11s.
Lemons (local), per gin case	2s. 6d. to 4s.
Mandarins (local Emperors), per case	6s. 6d. to 7s. 6d.
Mandarins (Thornies), per case	2s. to 3s. 6d.
Oranges (local), per case	4s. to 6s.
Navels, per case	10s. to 12s.
Sevilles, per case	2s. 6d. to 3s.
Passion Fruit, per half-case	5s. to 9s.
Papaw Apples, per half-case	4s. to 5s.
Peanuts, per lb.	5½d.
Pears, per gin case	9s. to 14s.
Pineapples (Queensland), common, per case	6s. to 7s.
Pineapples (Queensland), Ripley's, per case	6s. to 7s.
Pineapples (Queensland), Queen's, per case	5s. to 6s.
Strawberries, (Queensland), per 3-quart tray	3s. to 5s.
Tomatoes (Queensland), per bushel case	4s. to 5s.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	OCTOBER. Prices.
Apples (Eating), per case	9s. to 11s.
Apples (Cooking), per case	8s. to 10s.
Bananas (Cavendish), per dozen	4d. to 4½d.
Bananas (Sugar), per dozen	3d. to 3½d.
Cape Gooseberries, per case	6s. to 10s.
Custard Apples, per quarter-case	5s. to 6s.
Citrons, per cwt.	11s.
Lemons, per case	3s. to 5s. 6d.
Mandarins, per case	4s. to 10s.
Mangoes, per case	8s. to 10s.
Nectarines	...
Oranges (Navel), per case	9s. to 10s.
Oranges (other), per case	4s. to 6s.
Papaw Apples, per quarter-case	1s. to 1s. 9d.
Passion Fruit, per quarter-case	4s. to 6s. 6d.
Peaches, per case	...
Pears, per case	...
Peanuts, per lb.	3d. to 3¾d.
Persimmons, per quarter-case	...
Plums, per case	...
Pineapples (Ripley), per dozen	2s. to 3s. 6d.
Pineapples (Rough), per dozen	1s. to 3s.
Pineapples (Smooth), per dozen	2s. 6d. to 4s. 6d.
Strawberries, per doz. boxes	4s. 9d. to 9s.
Tomatoes, per quarter-case	6s. to 7s. 9d.

TOP PRICES, ENOGGERA YARDS, SEPTEMBER, 1911.

Animal.	SEPTEMBER. Prices.
Bullocks	£10 to £12 5s.
Bullocks (single)	£13 2s. 6d.
Cows	£8 5s. to £9
Merino Wethers	21s. 3d.
Crossbred Wethers	20s.
Merino Ewes	20s. 3d.
Crossbred Ewes	20s.
Lambs	18s. 3d.
Pigs (Porkers)	33s.

PRICES OF FARM PRODUCE FOR SEPTEMBER.

LONDON QUOTATIONS.

Article.	SEPTEMBER. Price.
Cotton (Uplands), per lb.	$5\frac{3}{4}$d. to $6\frac{15}{16}$d.
Cotton (Sea Island), per lb.	$11\frac{1}{2}$d. to 19d.
Cotton Seed, per ton	£6 to £8
Rubber (Pará), per lb.	4s. 10d. to 5s. $3\frac{1}{4}$d.
Rubber (Ceylon, Smoked), per lb.	5s. 4d. to 5s. $7\frac{1}{2}$d.
Copra (S.S.), per ton	£25 to £25 5s.
Copra (Ceylon), per ton	£27 10s.
Copra (Malabar), per ton	£28 2s. 6d.
Hemp (Manila), per ton	...
Hemp (Sisal), per ton	£21
Hemp (Indian Sisal), per ton	£12 10s. to £14 10s.
Hemp (Mauritius), per ton	£27 10s. to £28
Ramie Fibre (China Grass), per ton	£48 to £50
Soja Bean Oil, per cwt.	31s.
Soja Beans, per ton	£7 10s. to £8
Coffee (Costa Rica), per cwt.	66s. to 71s. 6d.
Coffee (Fair Greenish), per cwt.	74s. 6d.
Coffee (Low Middling), per cwt.	67s. 6d. to 68s.
Coffee (Bold Fair), per cwt.	71s. 6d.
Coffee (Liberian), per cwt.	65s.

OSTRICH FEATHERS.

The principal brokers engaged in the ostrich feather business in London are—

Messrs. Levis and Peat, 6 Mincing lane, London, E.C. Messrs. S. Piggin and Co., 44 Fenchurch street, London, E.C. Messrs. Hole and Son, 10 Fenchurch avenue, London, E.C. Messrs. Delton and Young, 38 Fenchurch street, London, E.C.

Besides these, there are about a score of feather merchants in London who import and handle ostrich feathers.

For the month of March, 1911, it may be stated that 105,500 lb. of feathers were sold, the prices ruling being as follows:—

White primes and blood feathers, £60 per lb. A few lots very fine, sold at £66 and £82 10s.

White-tipped (very fine), £30 to £38 10s. per lb. (One lot superior, £54).

Femina, light good to fine firsts, £27 10s. per lb.

Femina, thirds, £10 10s. per lb.

Bycocks, long (superior white, £17 10s. to £25), £15 10s. per lb.

Black, long good to fine, £7 10s. per lb.

Black, medium and short, common and pickings, 10s. per lb.

Drab, long good to fine, £7 10s. per lb.

Drab, medium and short, common and pickings, 2s. per lb.

Floss, medium black and drab, £2 2s. 6d. per lb. (Good large, 55s. to 57s. 6d.).

Floss, medium and short black and drab, 10s. per lb.

Spadones, white and light, £7 per lb.

Spadones, femina and drab, 11s. per lb.

Boos, white inferior to good, £5 15s. per lb.

Boos, femina and drab, £1 per lb.

The next auction sales will be held on 9th October and 4th December. Sales are held in London about six times a year. The above information was supplied to the Department of Agriculture and Stock by the Agent-General for Queensland, Sir Thomas B. Robinson.

Farm and Garden Notes for December.

FIELD.—The grain harvest will be now nearing completion, and to all appearance the results are likely to constitute a record, and the yield promises to be very satisfactory to the wheat-growers. The principal factor operating against a still greater extension of the wheat-growing industry is, that many farmers who formerly grew wheat and barley have turned their attention to dairying, which offers larger and quicker returns.

The dry weather which prevailed during parts of the month of August and September gave rise to grave fears for the harvest, but the subsequent timely rainfall came just in time to save the crop. The estimates of the probable yield have varied so considerably that it will be well to wait until the harvest is over before calculating on the result.

Given favourable weather, maize, panicum, imphee, Kafir corn, and sorghum may be sown. Arrowroot, ginger, and sweet potatoes may be sown.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool place. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulacca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

Orchard Notes for December.

The Southern Coast Districts.

December is somewhat of an off month for pines, though bananas should be improving both in quality and quantity. The purely tropical summer ripening fruits are not yet ready, and, consequently, there is only a limited supply of fruit in this part of Queensland during the month.

Early ripening varieties of grapes will mature, and care should be taken to market them in good order. The first fruit to ripen should be put up in small packages, as, if marketed in this manner, it will fetch a better price, but as it becomes more plentiful it can be packed in larger cases.

Pay particular attention during the month to all peaches, apples, pears, Japanese plums, or other fruits that are liable to be attacked by fruit fly, and see that no fly-infested fruits are allowed to lie about under the trees, and thus breed out a great crop of flies that will be ready to destroy the grape and mango crops as they mature.

If the month is dry see that the orchard is kept well worked so as to retain moisture in the soil, and, in any case, even should there be a good rainfall, it is necessary to cultivate in order to keep down weed growth, as if weeds are not kept in check now there is little chance of their being kept in hand once the January and February rains set in.

The planting out of pineapples, bananas, and most kinds of tropical fruits can be carried out during the month, especially if there is any rainy weather; but, if the weather is dry, it is better to defer the planting of tropical fruits till January or February.

The cyaniding of citrus trees can be continued when necessary, and where Maori or orange mite is showing it should be checked at once, as Maori fruit is of no use for the Southern markets, and is unsuitable for export to the old country.

The Tropical Fruit Districts.

Clean up all orchards, pineapple, and banana plantations as long as you have the chance of fine weather, so as to have your land in good order when the wet season commences, as once the rain sets in there is little chance of fighting weeds. Watch bananas carefully for fly, and market the fruit in good order. Handle the crop of pines carefully; don't let the fruit get too ripe, as an over-ripe Northern pine is tasteless. The fruit should be cut as soon as it is fully grown, as even when quite green the rough-leafed varieties have usually developed sufficient sugar to suit most persons' taste. Pack carefully to prevent bruising, and they will carry South in good order.

Only send high-class mangoes South—bad-flavoured sorts, and stringy, carroty, or turpentine flavoured varieties are not worth shipping. High-class fruit will pay to handle carefully, but there is no demand for rubbish, and I am sorry to say that fully 90 per cent. of the mangoes grown in the State must be classed under the latter heading.

Tropical fruits of all kinds can be set out during suitable weather. Fruit pests of all sorts must be systematically fought.

THE SOUTHERN AND CENTRAL TABLELANDS.

December is a busy month for the growers in the Stanthorpe district. Early apples, plums, peaches, nectarines, &c., will ripen during the month, and must be marketed as soon as ripe, as they do not keep long once they are gathered. Handle carefully, and grade better; there is far too much early rubbish slumped on to the local markets, which tends to spoil the demand as well as the price. Watch the orchards very carefully for Codling moth and fruit fly, and take every possible precaution to keep these pests in check should they make their appearance, as the future cleanliness of the orchard depends very largely on the care that is taken now to keep these pests in check.

If the month is dry keep the orchard and vineyard well cultivated. Watch the vines carefully so as to detect the first signs of Oidium or Anthracnose, and systematically fight these pests, remembering always that in their case prevention is better than cure, and that only prompt action is of the slightest value.

On the Darling Downs every care must be taken to keep the fruit fly in check, and on no account must infested fruit be allowed to lie about under the trees, as this is far and away the best method of propagating the pest wholesale.

In the Central District the grape crop will ripen during the month. Handle the fruit carefully. Cut it when dry, and where it has to be sent long distances to market pack in 6-lb. baskets rather than in larger cases. Where dry keep the orchard and vineyard well cultivated, and where the citrus and other fruit trees require it give them an irrigation. Don't irrigate grapes once the seeds have been formed, as it tends to deteriorate the quality, and to make the fruit tender and consequently to carry badly.

Agriculture.

FARMERS' FLOCKS.

By W. G. BROWN, Sheep and Wool Expert, Department of Agriculture and Stock.

It has been said by historians that "the introduction of sheep into any country has always been accompanied by a great increase in the wealth and comfort of the people of that country." That this is true may be seen when we consider the case of Australia. Pastoral products are responsible for more than half the value of the export trade of the Commonwealth; the persons engaged in the production and handling of them are by far the most important, in numbers at least, of all engaged in primary or secondary industries; and the pastoralist has been the pioneer who has made the way easy in opening up the vast areas of sheep country which lie north, west, and south of the Dividing Range. The Great Australian Desert has receded through his efforts, until we wonder whether Sturt ever saw it. Amongst the pastoral products the "golden-toed merino," as it has been so happily called, has held and still holds the chief place; but we are now rapidly coming to the time which comes in the history of all countries, since Cain, the agriculturist, ousted Abel, the keeper of sheep. On every hand the big areas are being divided and subdivided, and Abel, the pastoralist, is retiring farther and farther into the interior, eventually to disappear, as the hunter disappeared before him, his flocks and herds.

In the Commonwealth generally every stage of this process is to be seen at work. In Victoria, for instance, the total number of flocks in 1908 was 21,784. No fewer than 15,797 of these were flocks of under 500; there were 3,414 flocks of from 500 to 1,000 each; 1,490 between 1,000 and 2,000; and 411 from 2,000 to 3,000 each. Eight millions of the fourteen millions of sheep in Victoria in 1908 were comprised in flocks of 3,000 and under. Most of these were sheep bred for meat, or wool and meat. Victoria is now rapidly building up a big export trade in frozen mutton and lamb. In South Australia and New South Wales, too, this process is at work.

In Queensland the process is not nearly so far advanced. The very great majority of her 21,000,000 of sheep are comprised in flocks of 10,000 and over, and these comparatively large flocks are all merinoes—*i.e.*, are produced primarily for wool values. There are very few flocks bred for meat or meat and wool; of these, the great majority are on the Darling Downs, where there are also a number of New Zealanders settled. Australia has much to learn from New Zealand in the production of mutton and lamb for the export trade, for results show that they are easily first in that particular branch of sheep-farming. From the 1st January, 1911, Australia exported 1,278,563 sheep and 1,105,844 carcasses of lambs. New Zealand during the same period exported 1,405,178 carcasses of mutton and 2,988,043 carcasses of lamb. Australian lamb is quoted as being worth 4¾d. to 4⅞d., while New Zealand lamb is quoted at from 5½d. to 5⅝d. per lb. In conversation recently with an ex-Canterbury farmer, he informed me that he was now growing lambs on his place on the Downs, quite as good as anything he had ever seen on Canterbury Plains, and he was wondering at the lack of knowledge, or the ignorance of the Queensland farmer. He does not know that there is not a steady and reliable market here, nor a reasonable chance of selling his surplus stock when it is prime.

To revert to the text we started upon, "increase of wealth by the introduction of sheep." It would certainly pay the farmer below the Range, even under present conditions, if he were to run a few sheep on

his farm. The sheep improves all land, and is a first-class farm scavenger. There is no animal which pays such a good return and with so little trouble. Queensland has few diseases in her sheep—no footrot, little fluke, and none of the old-country diseases excepting worms. In Queensland the sheepman can fix to lamb his ewes practically at any time, can shear any month in the year, can grow as good an animal as any other part of the Commonwealth. Starting late, as she does, Queensland will have all the experience of the Southern States and New Zealand to draw upon, and that in itself is a big thing. She will not have to experiment in the countless methods of cross-breeding; for choice in the crosses which are most profitable has been narrowed down to, at most, four varieties, any one of which gives good results.

The above is a general advocacy of small flocks, and the conclusion is: All farmers should have a few sheep. They never fail to pay. They are good scavengers. They require little or no trouble to work. Therefore, I say again to the farmer: Get some sheep, profit by the experience of others who know, as to the kind, and you'll never regret it.

ARE DROUGHTS BENEFICIAL?

Arising out of a statement by Mr. C. F. Doutreband, of Sydney, that "droughts are Australia's salvation" (says the "Farmer and Settler"), there has been an animated discussion in the Press concerning the pros and cons of the drought problem, and many interesting statements have been made on both sides. It is matter of common observation that after a droughty period the rains furnish fattening grasses which quickly get stock into condition again; and pastoralists who have been able to pull through the dry period have found that the rise in prices, together with the speedy conditioning of their sheep, has quickly placed them in a position almost if not quite as good as they were in before the drought. To the smaller man a drought is a calamity, for he cannot last until the recovery takes place, and the banks reap all the benefit.

Mr. Victor Green (Shirleys' Limited) contends that all the blessings of a drought may be obtained without the ruinous cost; that in fact the principal benefit is the spell given to the land; and that this rest for the soil is a part of the regular routine in advanced flock and crop farming. The crop grower calls it fallowing; and every up-to-date farmer knows that with fallowing, rotation of crops, and fertilising he can use his land perpetually, improving it all the time, and never needing either a drought or a flood to bring it into heart again. The drought, the flood, the bush fire—these are Nature's ways; but they are very slow, and man has improved on them. The good farmer can get along very well without droughts, and when they come, the good farmer, again, is never so hard hit as his less thorough neighbour—for the well-tilled farm is practically drought-proof.

Mr. Green wrote:—"Your 'authority' on the blessings of droughts is not likely to find much support either from pastoralists or agriculturists—the people who have to fight the disastrous dry spells which, fortunately, have been conspicuous by their absence for the past few years. I cannot speak of the effect on the wool industry, not being sufficiently acquainted with its ramifications, but would just remark that drought is not necessary to sweeten the grass on pastures, for it is well known that the application of phosphatic fertilisers has that effect, and in addition creates a better growth, capable of supporting a larger number of stock.

"Mr. Doutreband says, 'Soil must get a spell somehow, and droughts give it a spell.' So does fallowing, which, besides cleaning and aerating the soil by frequent working, leaves it in such a condition as

to make it retentive of moisture. I would also point out that a long drought makes the soil so hard that the ploughs cannot be used until rain falls, but in the normal season, fallowing can be done with the best of results as affecting the next crop or two.

"There can be little doubt that a perfect system of fallowing, rotation of crops, and the use of superphosphates has quite changed the position of wheat farmers, and made their calling a safe instead of a precarious means of livelihood; for it has been proved beyond doubt that good crops can be, and have been, raised under the driest conditions by good farmers, who realise the wisdom of frequent working of the soil and scientific application of fertilisers. Perhaps Mr. Doutreband can convince wheat farmers that it was better for them to be ruined (as many were by the 1902-3 drought) than to make big money, as they have been doing during the past three years. Let him go into the wheat belt and try.

"Crops extract from the soil minerals such as phosphoric acid and potash. Surely no man will say they are restored to the soil by a spell. I would suggest that your correspondent study the reports of the Rothamsted experiments, which show a maintenance of fertility on soil continuously cropped or grazed for over forty years. There are no droughts there, and yet the crops and stock are as good as ever. Mr. Doutreband mentions his residence in New Zealand. Well, a month's dry spell there is regarded as a great misfortune. New Zealand farmers know the great possibilities of continuous cropping and grazing under up-to-date methods, one of the vital principles of which is the correct use of fertilisers.

"Are New Zealand sheep and cattle deteriorating in quality because there is no drought? No; the New Zealand sheep farmer feeds his pastures, and so assures his stock obtaining an abundance of good sweet grass. I cannot believe that droughts benefit New South Wales, and look to progressive methods of agriculture to increasingly improve the position it can attain by fallowing, rotation, and fertilising. I do agree that the absence of provision to conserve water and the burning of straw and grass are blots on our rural methods, and hope for better things in these directions."

PRODUCTION OF MAIZE.

(Concluded.)

QUICKER CULTIVATION.

Our inspector suggests how the production of maize may be cheapened. The single-furrow ploughs must give way to the multiple-furrow ploughs. It pays even the small grower to substitute the more-furrow plough to the single furrow. Harrowing must be done more cheaply by using harrows that will cover more ground.

Hand-planting is out of the question. Machine-planting is much more satisfactory in every way, and where a quantity of maize is grown the double-driller should be used. The ordinary wheat-drill may be fixed up to sow maize, and does very well; but for really good work and planting on the check system the double-driller does what is required.

MACHINES FOR HUSKING AND SHELLING.

Many farmers have their crops pulled and husked in the paddock, paying 5d. or 6d. per bag. This is an extravagant practice. In husking, if the grain is at all ripe, a quantity is rubbed off the tips and butts. If husked in the barn, any kernels which so come off may be swept up and used.

The old system of husking and shelling must be abandoned. There are machines now on the market for doing this work satisfactorily, and reducing the cost very much. The work has been carried out under contract at 7d. per 4-bushel bag, which is very much below the prices paid on the South Coast for hand labour.

MAIZE AND THE PIG.

Those farmers who grow only a few acres of maize could do much better with the crop by paddock-feeding pigs than by marketing the grain. This system of pig-feeding, the inspector states, has much to commend it, and there is no more economical way of marketing the crop than in the form of pork or bacon.

There is much room, however, for improvement in the pork and bacon industry. It needs developing in the same manner as the butter industry. It is not many years since butter was at very low market prices; but the systematic export trade has enabled greater quantities of dairy products to be produced at regular and payable prices. At present there is little more than a local demand for pork and bacon. China exports pork to Great Britain in large quantity; and there is no reason why we should not do likewise. With the pork or ham and bacon industry established on a sound basis, maize-growing would be found much more profitable.

VARIETIES OF MAIZE.

The only variety of maize which the inspector finds growing true to type on the South Coast is Golden King, or, as some call it, Hawkesbury Champion. He is surprised that farmers adhere to this variety, as it is a most undesirable kind. It is one of the slowest to mature; is too shallow in the grain; has too small a germ; too coarse in the stalk; and it has the largest core of all the varieties.

Of a number of samples submitted to the inspector at a lecture given by him at Dapto, two exhibits of Golden King maize gave 35 and 33 per cent. of core respectively; whilst a quick-maturing variety, like Early Leaming, had about 16¾ per cent. of core.

We want pure varieties of maize, just as we have wheats, for Australian conditions. Maize easily inoculates; and care must be taken when a pure variety is secured to keep it so. It is generally admitted that the old varieties are too much mixed up, and it is the exception to see any kind of maize pure except Golden King, which is a maizena maize.

BEST PLOUGH FOR MAIZE.

The question has been raised by Mr. A. J. Jeffrey, Summer Hill, Moruya, as to whether the mould-board or the disc is the more profitable implement in cultivating for maize. Both kinds of plough are used on the South Coast; but the mould-board type gives the most satisfaction.

A good mould-board plough completely inverts the sod—the disc plough does not. For the disc to do effective work the ground must not carry too much trash. The disc is the best for cross-ploughing. It pulverises the sod to a greater extent than does the mould-board plough, without disturbing the subsoil.

To prepare for maize, it is most desirable to plough deeply in June or July, and let the ground lie fallow—occasionally stirring the surface to conserve moisture—until planting time, and before planting to cross-plough, turning a shallow furrow.

Farmers made a great mistake in their adherence to the single-furrow mould-board plough. There are numerous types of multiple-furrow ploughs on the market. These do excellent work, and mean a saving of time and money.—*Farmer and Grazier.*

SUMMER CROPS FOR WINTER USE.

By G. B. BROOKS, Instructor in Agriculture.

The adverse climatic conditions experienced during the past winter have not only proved disastrous to the growing of green winter feed and hay crops, but have reduced all reserves of dry fodder to almost vanishing point.

Unfortunately we have no guarantee that the coming winter will not be a repetition of the one just gone through, and the stockowner who looks a little ahead and provides himself with a supply of fodder to see him safely through a dry spell, will unquestionably be well repaid for his trouble. Past experience has shown that a good deal of risk is attached to the growing of feed during the dry winter months. Therefore, it is to the moist summer months that we must look with an assurance of certainty to furnish our requirements.

In connection with the feeding of dairy stock, it is a well-established fact that cows will not give a large flow of milk if fed on material in a dry state, no matter how good it may be. Therefore, as far as the keeping up of the milk and cream return is concerned, succulent feed must be supplied.

The conservation of summer crops for winter use is, without a doubt, best accomplished by means of the silo. It is not my intention, however, to deal with ensilage making, as information on this point will be available shortly in pamphlet form. My object at present is to discuss the next best means whereby summer crops can be grown, and also to explain the best method of utilising them for winter use.

To best accomplish this a variety of crops must be grown—crops that will withstand a fair amount of frost, keep green in the field for a lengthy period, and thus keep up a supply of green material during the winter months.

Of course, local climatic conditions will have to be taken into account as they will determine in a large measure the period over which the crops suggested will remain available for use, the area to be planted of each, together with the time to plant.

The crops recommended as being the most suitable for a wide range of climate are maize, sorghum, and Indian or cow cane, and the rotation upon which they are to be utilised will be determined by their susceptibility to frost. Under these conditions, maize would come in as the first crop to be used. It should be planted sufficiently late in the season so as to reach the cobbing stage, and be made use of, before the advent of very heavy frost. This would provide feed for the early winter. Fairly thick planting should be resorted to, in rows sufficiently wide, however, to allow of scuffling. Cultivation not only keeps down weeds, but has a marked effect in increasing the yield. Heavy, strong growing varieties should be selected, such as Hawkesbury Champion, Red Hogan, or Hickory King. As far as feeding value is concerned, maize is, with the exception of green barley and other cereals, one of the best green fodder crops that can be grown.

The crop to follow on after maize would be sorghum. Planting should take place in the coastal districts in January, in colder localities a month earlier. In places where severe frosts are likely to be experienced, broadcasting the crop may be practised with advantage, 20 lb. of seed being required per acre. In more mild situations, seeding in rows is to be recommended, the rows 3 ft. distant, only 5 lb. of seed being required in this instance. This crop, although not having the high feeding qualities of maize, is, nevertheless, an exceedingly valuable one to grow. It stands a good deal of frost, is a splendid drought resister, a

heavy cropper, and not too particular as to soil. In many districts when fairly severe frosts have been experienced this crop has kept in a useful condition throughout the entire winter, and the opinion of many users is that it is the best stand-by fodder they have grown.

There are several good varieties to choose from, Amber Cane and Planter's Friend being amongst the best. Saccharatum, or Black Sorghum, is to be avoided, as it invariably develops a red stalk fungus, and is in consequence of little use as a stand-over crop.

The converting of sorghum into a dry fodder is not to be recommended.

Indian Cane, although only in the experimental stage in many districts, is finding favour with many dairymen as a useful stand-by, it being more of a frost-resister than either maize or sorghum.

Planting by means of sets, in rows about 4 ft. apart, allowing a space of 18 in. between the plants, should be carried out during early summer, when conditions are favourable as to moisture. The sets should be laid flat in the row, not planted on end as is commonly the case. As this crop is more or less of a permanent nature, rich, well worked up soil should be selected, so as to obtain the best results. Care should also be exercised in harvesting to cut level with the ground.

In addition to the crop just mentioned, it is also desirable to conserve something in the shape of dry material, even if only a stack or two of bush hay.

In millets we have a summer crop that is easily grown, a heavy yielder, and at the same time capable of being converted into a hay of good quality. I have met many dairymen recently who have been feeding this crop to their cows, and on being asked their opinion on it as a fodder the reply was that their only regret was that their supply was not greater. There are numerous varieties, and much confusion unfortunately exists as to the nomenclature of such, more especially in connection with the White and Japanese sorts, the seed being very much alike. The varieties most commonly grown are the common or giant panicum (*Panicum Germanicum*), white panicum (*P. Frumentaceum*), and Japanese Millet, which has not, so far as I am aware, been classified. It is, however, closely allied to *Panicum colonum*. The white panicum is undoubtedly the favourite variety. It is a very heavy cropper, stock are very fond of it, and it, moreover, makes a good quality chaff. The stalk is more hollow than that of the other sorts; dries soft, and on being chaffed splits into sections resembling oaten chaff. In the common and Japanese millets the stalk is more pithy, the sections remaining intact, giving the chaff a coarse appearance.

The Japanese is much the earliest variety of the three, and will, in an ordinary season, produce two fair cuttings, although the total yield will not be greater than that of either of the others.

Panicum being a quick growing, succulent crop, requiring a large amount of moisture, it follows that the best time to raise such is during the wet season. Generally 12 to 18 lb. of seed is sufficient to broadcast an acre.

In harvesting it is imperative that cutting should take place practically as soon as the seed head appears. Should the seed be allowed to form, the resulting hay is very unpalatable.

Owing to the high moisture contents of the plant at harvesting time, cutting with the mower is recommended. If cut with the binder it is extremely difficult to cure the centre of the sheaf.

Should there be difficulty in curing owing to moist weather, a sprinkling of salt when stacking will go a long way towards preventing heating.

SUGARCANE ON THE DARLING DOWNS.

Mr. R. K. Stainton, head master of the State school at Wyreema, near Toowoomba, has, at the request of the Under Secretary for Agriculture and Stock, supplied the following interesting particulars concerning experiments made at the school in the cultivation of sugarcane. Some years ago we planted a little sugarcane of the Rose Bamboo variety in the garden at the Toowoomba Grammar School, and also a couple of young mango trees. Both grew well during the summer months, but the earliest frosts killed them completely.

The following notes on a chance experiment with sugarcane in a school garden in the neighbourhood of Toowoomba may not be without interest to farmers on the Downs, many of whom are, at times, hard put-to for fodder for their stock. The properties of cane as a food for cattle were demonstrated in the "big drought," when a large quantity was brought to the Downs by rail, and a crisis thereby tided over. The object of these notes is to show that one variety at least of cane, hitherto regarded as an impossible crop in these parts, has taken kindly to its new climatic surroundings, and could be cultivated here with a fair prospect of success.

A sugar-planter near Bundaberg, Mr. H. A. Cattermull, with the idea of giving a treat to the children, sent to this school early in 1910 a large parcel of four varieties of sugarcane—Rappoe, Singapore, New Guinea 4B, and 1135 Demerara Seedling. After using the cane as an object-lesson, and distributing pieces to the children, the remainder was planted in the school garden. The entry in the field-book reads thus: "Thirteen plants of cane from the Woongarra Scrub were planted to show the effects of frost on tropical plants, and the uselessness of fighting against natural conditions." The sequel will show how one variety, far from being killed, has learned to so far acclimatise itself to the severer climate that it triumphantly withstood the severer conditions on the Downs.

The first frost settled the first three named in the list, and it was expected that nothing less would happen to the fourth. But it safely passed through the first winter, young as it was. All through the summer of 1910-11 it grew strongly, making about 6 ft. of cane, the sheath clinging so closely to the stick that very little cane was visible. It was as if the plant knew it was a stranger to the climate, and was taking precautions accordingly. The late winter (1911) frosted the flag, but frost after frost failed to get past that protective wrapping to the tender heart, and the cane came through the trial with colours flying.

Mr. Cattermull paid us a visit towards the close of the winter, and has kindly supplied the following notes of his observations on what he saw:—

"The 1135 seemed to me to be adapting itself to the climate of the Downs. The sticks were rather thin for plant cane; the leaves (dry) did not leave the cane freely, but were very tight and fast, more especially round the top. I could see that the frost had been at work, as the leaves were frosted more or less, but on examination I found that the heart and stick of cane were untouched by frost and perfectly sound. The reason of this was that the sheath leaves clung so closely to the stick. In the Bundaberg district plenty of this kind of cane was badly frosted.

"I should suggest that further experiments be made with this cane, also with Indian cane.

"One objection to the 1135 as a fodder cane is that it is of a hard and slightly hairy nature, while on the other hand the Indian cane is soft and not hairy."

In conformity with the above suggestion, we have cut all the cane, and planted sufficient for our purpose in the school garden, hoping for still better results from the second generation. The boys took the balance home with them, and planted same in their own farms.

In the light of the above results farmers might risk the possible loss of an acre or two up to five acres from their cultivation paddock, and plant with 1135 cane, for the sake of the quite probable gain in a fodder of the greatest utility, when all else—perhaps except prickly pear—may have failed them. The cane is easily obtained, easily planted, and kept clean (clear instructions are published in the "Journal" for October), and is no trouble once it covers the ground. Now is the best time to plant on the Downs. Any query addressed to the Editor as to how to obtain the plants and other details would meet a ready reply.

Once the crop gets a hold you have it for at least five years, with a probable yield of at least 8 to 10 tons per acre. It could be cut from day to day in sufficient quantity to feed the number of stock on the farm, or enough could be cut at once to last three or four days, as seemed most convenient. The nearer the ground it is cut the better.

A sample of this cane was sent to Dr. Gibson, at Mackay, and his reply showed that after examination he could find no trace of frost. Had frost touched it its utility for fodder would, of course, have vanished.

THE VALUE OF LOOSE SOIL MULCH IN DRY SEASONS.

Mr. C. E. Wood, manager of the Kamerunga State Nursery, near Cairns, supplies the following information regarding the vicissitudes of the weather during the year 1911, and points out the advantage to be derived from an adaptation of the system of "dry farming" adopted in districts where the rainfall is precarious:—

"The saying that in Queensland it is either a feast or a famine has been well illustrated this year, even in the Cairns district, where, taking an average year, the rainfall is generally sufficiently distributed to provide both grass and water all the year round. The year 1911 has been phenomenal both from a wet and dry point, and reports show that similar conditions have prevailed in some other countries—for instance, the abnormal floods in France, where trees are now reported to be dying from drought. At Kamerunga State Nursery the rainfall this year from 1st January to 30th April totalled 145.830 in., or more by 36.881 in. than any previous year during the last twenty-two years for the same portion of the year; again, from 1st May to 30th September the rainfall was only 4.618 in., which is the lowest rainfall for twenty-two years during these months.

"From the above it will be seen that the year has been far from favourable for the man on the land, as crops were in many cases destroyed by floods and cyclones; while now, where cane-planting was unavoidably delayed, there is not sufficient moisture to start the young plants—this, of course, applies to other crops as well. On the other hand, a dry season such as the present has the advantage of showing up the benefits to be derived from good cultivation—for instance, ground

that was well worked after the rain and left with a loose earth mulch, so as to prevent evaporation, will show by the crops growing in it that there is still good moisture within reach of the roots; and, although maximum crops cannot be expected, the soil being loose will enable crops to take advantage of and benefit to the full by the first rain that falls.

" A glance at the Nursery block of young Pará rubber trees on the Barron River clearly shows the good results to be derived from the loose soil mulch method; in fact, whenever this has been practised, crops, in spite of the long dry spell, are making fair growth, and have none of the stunted appearance so noticeable where the surface of the soil is hard."

RHODES GRASS IN THE NORTH-WEST.

Mr. J. R. Chisholm, the Plains, Prairie, referring to an article on Rhodes Grass which appeared in the April issue of the " Journal," writes:—

" Around Prairie district, on the Northern Railway, 208 miles west of Townsville, a Rhodes Grass has taken possession of very large areas of country during the past three years. In the earlier months of the year, when the grass is in ear, the appearance of hundreds of acres resembles a field of wheat. It favours clayey land, but moderately sandy soil also extends hospitality to it. Some of our creek frontages were scalded clay-pans, mostly wind-swept. These have been transformed into pasture, and, in the wetter months of the year, are a sward close cropped by sheep.

" The great value of the newcomer as a fodder is best evidenced by our milking cows. They used to go away to the limit of the paddock. Now, seldom are they ' out of sight.' We cut a few loads of the grass for hay on the 3rd of March. I thought it would be stalky, but all the stock ate it readily. We had then, however, completed our yearly stacks. This year, the good Mitchell grass and Flinders grass hay, which we have been so proud of, must take second place.

" Mr. F. M. Bailey, Colonial Botanist, identifies this grass as one indigenous to the West of Queensland, the botanical name of which is *Chloris*. To the layman it appears to be identical with the cultivated Rhodes Grass. I may add that I have not known this grass to spread in any other district.

" We have a tract of country by the railside, mostly sandy, but on the flats loamy. All over these flats now, after 6 months rainless period, damp, clayey sand is found at 2 feet. This goes down to a marly rock, which contains water at, say, 7 to 8 ft. from the surface. Earlier in the year the soil is damp to the surface. It appears as if the water of the wet season is stored in the rock, to be drawn up by evaporation. The top soil is very good, and appears to favour potato growing. Agriculture is experimental in this country, but I am trying ten acres. Our local market is £12 to £14, and rising."

In reference to the above, Mr. F. M. Bailey says:—" In Queensland there seem to be several forms of *Chloris barbata*, var. *decora*, Benth., and one of these forms sent to me some time ago by Mr. Chisholm certainly approached very closely to one of the *Chloris* known here as ' Rhodes Grass,' and I have in the ' Catalogue of Queensland Plants,' now being published, placed the form previously known here as *var. decora* under *C. virgata*, Sw., according to Sir J. D. Hooker, F.I., Brit. Ind. VII., 291-2.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF OCTOBER, 1911.

JERSEYS.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
		Lb.		Lb.		£ s. d.
Cocoa	1-5-1911	517	4·3	24·98	11½d.	1 3 11
Bliss	5-9-1911	519	4·1	23·81	,,	1 2 10
Careless	16-12-1910	428	4·7	22·65	,,	1 1 8
Bluebelle	20-4-1911	396	4·7	20·96	,,	1 0 1
Four Cows ...	...	1,860	17·8	92·40	,,	4 8 6
Average ...	...	465	4·5	23·10	,,	1 2 2
HOLSTEIN.						
Daisy	2-2-1911	552	3·8	23·36	11½d.	1 2 5
AYRSHIRES.						
Auntie	31-7-1911	1,251	3·9	54·43	11½d.	2 12 2
Queen Kate ...	10-12-1910	572	4·8	30·93	,,	1 9 8
Lady Margaret ...	4-2-1911	564	4·7	29·85	,,	1 8 7
Lydia	9-9-1911	667	3·8	28·25	,,	1 7 1
Rosebud	24-6-1911	563	3·9	24·50	,,	1 3 6
Five cows ...	...	3,617	21·1	167·96	,,	8 1 0
Average ...	...	723	4·2	33·59	,,	1 12 2

Lady Margaret, Queen Kate, Imported—First calf.

SHORTHORNS.

Cow.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
Honeycombe ...	29-8-1911	1,215	3·8	42·98	11½d.	2 1 2
Glen	30-9-1911	908	4	40·58	,,	1 18 11
Duchess Fanny 27th	24-8-1911	707	3·6	28·28	,,	1 7 1
Norma	12-8-1911	599	4	26·78	,,	1 5 8
Bangle	14-8-1911	597	4	26·69	,,	1 5 7
Rusty	4-9-1911	599	3.8	25·37	,,	1 4 4
Dora	11-6-1911	514	3·7	21·15	,,	1 0 3
Seven cows ...	...	5,139	26·9	211·83	,,	10 3 0
Average ...	...	734	3·8	30·26	,,	1 9 0

Duchess Fanny 27th—First calf.

GRADES.

Cow.	Breed.	Date of Calving.	Milk.	Test.	Butter.	At per lb.	Value.
			Lb.		Lb.		£ s. d.
Night	Holstein-Shorthorn	27-9-1911	609	4	27·22	11½d.	1 6 1
Lalla	Holstein-Ayrshire	24-9-1911	626	3·7	25·76	"	1 4 8
Nancy	Guernsey-Shorthorn	9-8-1911	512	4	22·87	"	1 1 11
Three cows ...	...	...	1,747	11·7	75·85	"	3 12 8
Average ...	...	...	582	3·9	25·28	"	1 4 3

AVERAGE FOR OCTOBER, 1911.

No.	Breed.	Milk (lb.)	Test.	Butter (lb.)	At per lb.	Value.
						£ s. d.
4	Jerseys	1,860	17·8	92·40	11½d.	4 8 6
1	Holstein	552	3·8	23·36	"	1 2 5
5	Ayrshires	3,617	21·1	167·96	"	8 1 0
7	Shorthorns	5,139	26·9	211·83	"	10 3 0
3	Grades	1,747	11·7	75·85	"	3 12 8
20	...	12,915	81·3	571·40		27 7 7
	Average	646	4·6	28·57	"	1 7 5

Average cow value £1 7s. 5d. for October, 1911.

The following cows, namely—Auntie, Lady Margaret, Queen Kate, Honeycombe, and Rosebud received the following daily ration from 1st to 12th October:—4 lb. bran, 2 lb. crushed oats, 25 lb. green stuff (lucerne), and from 13th to 31st October each received 2 lb. barley, 2 lb. crushed oats, 25 lb. green stuff (lucerne) daily. They were grazed on natural pasture.

The remaining fifteen cows were grazed on lucerne stubble during the forenoon daily from 1st to 26th October, and from 27th to 31st October received 25 lb. ensilage (lucerne) daily.

The cost of feeding for month each of the following cows:—Auntie, Lady Margaret, Queen Kate, Honeycombe, and Rosebud:—

			£ s. d.
48 lb.	Bran at £4 10s. per ton	=	0 2 2
24 ,,	Crushed Oats at 3s. per bushel	=	0 1 9
38 ,,	Crushed Barley at 3s. per bushel	=	0 2 3
775 ,,	Green Lucerne at £1 10s. per ton	=	0 9 11
			£0 16 1

Cost of feeding five cows at 16s. 1d. = £4 0s. 5d., and the commercial butter returns amount to £8 15s. 1d., leaving a profit of £4 14s. 8d.

The remaining fifteen cows, each, cost to feed for month, as follows:—125 lb. ensilage (lucerne) at £1 10s. = 1s. 8d.

Cost of feeding fifteen cows at 1s. 8d. = £1 5s. The butter returns equal £18 12s. 6d., thus leaving a profit of £17 7s. 6d.

Total Cost of Feeding Twenty Cows for October ...	=	£4 5 5
Commercial Butter Returns		27 7 7
Total Profit		£22 2 2

NOTES ON BUTTER-GRADING.

During the month of October the Government graders examined 5,809 boxes of butter, consisting of 2,602 boxes of salted, 2,195 unsalted, 891 pat, and 121 cases of tinned; 32 crates of cheese and 53 cases of condensed milk also were inspected.

Owing to the dry weather there is a marked falling off in the quantity of butter examined compared with that for the corresponding month of last year, the total for which was 31,350 boxes, a difference of 25,541 boxes.

The shrinkage in the amount manufactured is, probably, not so great; for, owing to the stricter administration of the Commerce Act with regard to false trade descriptions, the lowering of the standard for moisture, short weights, excessive boric acid, and other irregularities, scarcely any butter but that for export beyond the Commonwealth was submitted for examination. Despite this fact, however, the shortage in our output is very great. Towards the end of last winter, though the season was one of the best experienced in Queensland for years, milking cows and weaners died from poverty. This should act as a warning to dairymen to make better provision for winter feed for their stock. If such conditions exist in a comparatively good season, in a drought the consequences of overstocking, or neglecting to provide the necessary sustenance for dairy herds, would be appalling.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

Table Showing the Total Rainfall for each Month of the Year in the Agricultural Districts of Queensland.

Stations.	1910.			1911.									
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.
North.													
Bowen	0·30	3·89	5·36	23·72	7·57	10·66	1·64	0·12	0·2	Nil	0·15	Nil	1·5
Cairns	1·67	7·27	11·59	34·49	27·43	35·35	52·31	2·08	1·44	1·48	0·27	0·6	0·88
Geraldton (Innisfail) ...	3·18	7·30	4·77	36·96	35·51	28·39	50·53	3·58	5·10	6·20	0·79	0·30	0·73
Gindie State Farm ...	...	...	3·87	11·69	4·15	2·29	0·29	0·29	Nil	Nil	0·49	...	0·81
Herberton	0·43	4·93	9·71	11·43	13·16	15·35	14·17	0·58	0·36	0·40	0·5	Nil	0·9
Hughenden	1·57	3·41	1·13	9·15	3·76	0·17	6·29	0·4	0·2	0·2	Nil	Nil	Nil
Kamerunga State Nurs.	2·06	...		...	23·08	...	52·28	1·51	...	...	...	...	...
Mackay	0·7	2·67	2·15	30·52	13·04	14·41	3·14	0·77	0·22	0·43	0·18	0·3	0·93
Mossman	3·17	10·36	19 91	32·76	21·95	71·64	37·10	1·14	0·33	1·28	...	...	0·96
Rockhampton	0·99	4·17	2·46	9·64	21·07	6·39	1·41	0·56	Nil	0·24	1·17	Nil	0·40
Townsville	0·11	2·53	6·77	25·40	19·24	4·24	3·02	0·7	0·11	Nil	Nil	Nil	0·39
South.													
Biggenden State Farm	2·36	4·59	5·96	10·37	7·34	6·25	...	...	...	...	...	0·79	...
Brisbane	3·27	2·49	13·99	10·30	5·84	4·69	0·88	0·90	0·9	1·70	2·22	0·84	4·95
Bundaberg	0·70	8·39	1·58	21·05	9·75	4·31	1·46	0·56	Nil	0·37	1·15	Nil	2·36
Crohamhurst	3·83	3·31	6·20	28·85	19·20	16·67	2·94	1·21	0·13	3·58	2·62	0·51	6·27
Dalby	3·96	4·09	3·29	8·08	2·24	3·20	0·76	0·91	Nil	0·68	0·43	0·42	3·45
Esk	3·41	3·84	7·53	11·90	6·04	3·54	0·99	1·90	Nil	...	1·51	2·04	4·17
Gatton Agric. College	3·60	2·85	6·84	12·03	3·98	2·80	1·38	0·58	Nil	0·72	0·90	0·96	3·77
Gympie	2·90	3·16	1·96	9·13	5·33	6·02	1·88	0·32	Nil	0·97	0·48	0·26	2·42
Ipswich	3·70	1·96	5·04	8·15	4·19	2·51	1·38	0·42	Nil	0·59	1·12	0·34	4·71
Maryborough	1·53	4·19	3·19	16·93	6·58	7·20	2·61	0·16	0·11	0·62	1·47	0·9	2·81
Roma	3·64	4·39	0·96	11·52	5·94	1·25	0·14	1·13	Nil	0·67	1·55	0·87	1·9
Roma State Farm ...	2·95	3·50	7·97	9·72	...	5·39	0·04	·02	...	...	1·39	0·74	1·31
Tewantin ...	3·17	7·71	8·25	20·84	8·50	18·11	1·78	0·57	0·22	2·53	1·07	0·4	7·48
Warren State Farm ...	0·45	...	...	...	11·75	3·17	...	...	Nil	0·6	1·01	...	0·64
Warwick ..	2·20	3·86	3·46	7·13	2·01	3·12	0·74	1·04	Nil	1·20	1·50	0·80	1·78
,, Hermitage State Farm	...	...	...	...	...	...	...	...	...	...	...	...	0·60
Westbrook State Farm	2·98	...	4·44	5·26	3·90	1·76	5·50	0·79	0·1	1·1	0·54	0·82	1·77
Yandina	3·34	5·16	16·05	12·04	10·73	12·02	2·68	0·28	Nil	2·43	Nil	0·30	2·90

Note.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

Poultry.

REPORT ON EGG-LAYING COMPETITION, Q.A. COLLEGE, OCTOBER, 1911.

Three thousand two hundred and twenty-eight eggs were laid during the month, an average of 134.5 per pen. Broodies are now becoming troublesome, no less than 35 having been out in the course of the month, including 16 White Leghorns. A bird from Mr. Stewart's No. 2 pen and one of Mr. Hammill's died during October. Mr. Dalrymple wins the monthly prize with 151 eggs. The following are the individual records:—

Competitors.	Breed.	October.	Total.
J. F. Dalrymple, N.S.W.	White Leghorns	151	815
Range Poultry Farm	Do.	139	792
E. A. Smith	Do.	144	779
Yangarella Poultry Farm	Do.	140	774
J. Holmes	Do.	141	768
Alex. Smith	Do.	137	748
Cowan Bros., N.S.W.	Do.	138	724
Mrs. Kinnear, S.A.	Do.	141	723
A. Hollings, N.S.W.	Do.	135	714
J. McKay	Do.	139	710
A. J. Cosh, S.A.	Do.	136	698
J. Gosley	Do.	147	696
S. Chapman	Brown Leghorns	144	686
R. Burns	White Leghorns	147	680
A. H. Padman, S.A.	Do.	132	647
H. Hammill, N.S.W.	Do.	124	635
J. Zahl	Do.	148	619
R. Burns	S.L. Wyandottes	135	613
A. Astill	White Leghorns	119	516
Mrs. A. A. Carmichael	Brown Leghorns	110	506
R. W. Goldsbury	White Leghorns	139	494
J. K. Stewart	White Plymouth Rocks (1)	117	366
J. K. Stewart	Do. do. (3)	116	342
J. K. Stewart	Do. do. (2)	109	284
Totals	...	3,228	15,329

EGG-LAYING COMPETITIONS.

When the Scottish Commissioners visited Australia last year they were much interested in the results of egg-laying competitions which are carried out in all the States of the Commonwealth. On this portion of the Commissioners' Report the "Journal of the Board of Agriculture," England, says:—

In dealing with the poultry industry, reference is made to the well-known laying competitions which have been carried on for a number of years under Government supervision in each of the six States. The competitions date from 1901, and usually extend over twelve months. Apart from their value as a means of building up an egg-producing strain of fowls, which is the object their promoters have in view, they afford

evidence of the average yield of well-bred birds, and indirectly of the "profit" or surplus receipts from the sale of eggs over the cost of food. As an example of this, the following table may be given, showing the results of some of the twelve-months' competitions in different States:—

—	Number of Birds.	Number of Eggs Laid.	Average Number of Eggs per Hen.	Cost of Food per Hen.	Net Profit per Hen.
				s. d.	s. d.
New South Wales	360	63,318	173	7 0	10 2
Queensland	168	30,543	181	4 8½	10 1½
South Australia	450	80,959	179	5 4	6 4
South Australia	678	126,133	186	5 6	8 4
Tasmania	168	27,106	161	6 9	9 2½
Western Australia	288	50,788	176	6 8	13 3

The average production over all these competitions was about 175 eggs annually, which, considering the number of birds entered, is a very high figure. The winning pens, comprising six birds each, accounted for very much larger numbers, the figures in four competitions being 232, 222, 255, and 254 per hen. In fact, it is stated that for breeding purposes, very little value is attached to a bird whose score falls under the 200 standard. From 220 to 240 the birds are considered useful, while when yielding above this number they become valuable. Individual scores of 270 and 280 are not unknown. It is from the best performers in this severe test that the stock birds for the ensuing season are chosen. The same care is taken in selecting the male bird.

These egg competitions are a distinctive feature of Australian poultry-keeping, and they have exercised a great influence on its development, particularly by fostering the commercial or utility aspect of the industry in preference to the production of exhibition stock. Utility strains, while maintaining the type and general characteristics of the breeds, are most carefully bred with a view to the progressive improvement of egg production, and there appears to be evidence that this practice of careful selection has improved the production of several breeds, particularly white Leghorns. The assistance of the State in this direction has been of great value, and its supervision not only assures perfect fairness to the competitors, but gives to the tabulated results the stamp of official accuracy.

A two years' competition was held in New South Wales in 1906-8, which was won by a pen of six Langshans, with a score of 2,487 eggs, or 414 eggs each in two years. A three-years' test also was completed in March last, the object being to show the difference in egg production in the first three years of a hen's life. The results of the two completed years showed that the eggs produced in the second year were about one-fourth less than in the first year, the forty hens competing averaging 140 eggs per bird, as against 190 eggs in the previous year.

The sum shown as profit in these competitions represents the actual return obtained from the sale of the eggs, less the cost of the food, but nothing is charged for labour or for interest on capital. It is considered, however, that in the ordinary conditions in which poultry are kept in Australia, there is but a small expenditure on plant, while the labour would be done by the ordinary staff without extra expense. Moreover, birds at liberty gather a fair proportion of their own food from stubbles, pasture fields, and orchards, and the consequent reduction in the cost of foods, together with the value of their manure, may be put against the interest and labour.

State Farms.

ROMA STATE FARM.

Notwithstanding the dry conditions which have prevailed during the past eight months some fair crops of winter cereals have been raised at this institution.

Such a season as we have just experienced is unsuitable for the farmer, but is necessary before the relative value of research work being carried out in connection with the best methods of cultivation and propagation of suitable varieties, &c., can be ascertained. Up to the present the chief crops experimented with have been winter cereals, fruits, and fodder crops.

To the first-named more attention is being devoted, chiefly on account of the poor returns at present being obtained from the area under this crop, and the immense areas which are suitable for its cultivation, and which most assuredly will some day be under it.

Five seasons have elapsed since investigations were commenced, and it is hoped that a good deal has been accomplished towards ascertaining the most suitable methods of cultivation to adopt, most suitable varieties to grow, value of fertilisers, and best time to sow. In addition to these the breeding of new varieties is being carried out, improving by selection, the testing of various fungicides for the prevention of smut, &c.

This season the cultivation tests consist of seventeen blocks, with a total area of 18 acres; variety tests, 28, area 13½ acres; fertilisers, 24, area 4 acres.

In order that the farmers may be in touch with the work being carried out, it is intended in subsequent issues of the "Journal" to publish articles bearing on the different problems being solved.

WHEAT MANURING EXPERIMENTS, 1911.

The experiments as laid down by the Agricultural Chemist, Mr. J. C. Brünnich, last year have been continued with this season on two classes of soil—viz., loamy and sandy—there being thirteen blocks on the former and ten on the latter.

The loamy soil block is considered to contain some of if not the best wheat land on the farm, whereas the sandy soil, which is nearly pure sand, is of the poorest.

Notwithstanding the rather dry season the results have been very gratifying, and demonstrate—in a manner more appealing to the farming community than a chemical analysis showing the deficiencies in the soil—the benefits which may accrue from manuring. There are many farms within easy distance of Roma, off which fair crops have been garnered this season, which, if results obtained here are any indication, would have yielded from 4 to 6 bushels more per acre had they been treated in a similar manner, and it is not until such procedure is adopted that the full value of the lighter lands in this district as wheat producers will be ascertained.

It is pleasing to note that last season's results brought forth enquiries, and this will result in at least three or four farmers experimenting in this direction for themselves in 1912.

The following is a table giving the experiments, with the results obtained, in 1910-11:—

SANDY SOIL EXPERIMENTS, NO. 1.

Area of Blocks, ¼ Acre. Variety Sown, Bunge No. 1. Top Dressed, 19th August. Harvested, 23rd October.

Block.	Manure Applied per Acre.	Cost per Acre. £ s. d.	Remarks.	Yield per Acre, 1911.	Yield per Acre, 1910.	Average.
1	Shirley's cereal manure, 1 cwt. to acre ...	0 6 0	Nice even crop, 3 ft. 6 in. high. Straw of good quality	26·8	17·2	22·0
2	1 cwt. Shirley's cereal manure ... ... ½ cwt. Nitrolim (top dressing)	0 6 0 0 8 3	Nice even crop, 3 ft. 6 in. high. Heads large, well-filled: straw, nice clean; good quality. A week later than No. 1	28·6	18·86	23·73
3	½ cwt. Shirley's cereal manure ... ... ½ cwt. Nitrolim (top dressing)	0 3 0 0 8 3	As applied to No. 2	28·3	20·2	24·25
4	Control (unmanured)	...	This block, on portions where soil was poor, was very thin, and one end afforded a splendid illustration as to the value of manuring in evening-up a crop 2 ft. 6 in. high	20·4	17·6	19·0
5	1 cwt. superphosphate	0 5 0	This block was the most even, and ripened first. Straw not so tall or stout as in Nos. 1, 2, and 3	26·1	21·73	23·91
6	Thomas' phosphate, 1 cwt. to acre	0 5 6	This block was uneven, of poor appearance; did not ripen as early as the super. block, 2 ft. 6 in. high	21·2	17·0	19·1
7	Stable manure, 15 tons to acre ... ... ½ cwt. superphosphate	2 5 0 0 2 6	The absence of sufficient rain to decompose thoroughly and solidify the ground prevented full benefits accruing. Straw short; crop inclined to be weedy; ripened unevenly	22·1	17·72	19·9
8	1 cwt. superphosphate ... ... ½ cwt. Nitrolim (top dressing)	0 5 0 0 8 3	Crop, considering the unevenness in quality of the soil, good height; ranged from 18 in. to 3 ft.	21·2	18·8	20·0
9	½ cwt Nitrolim ... ... ½ cwt. sulphate potash ... ... 1 cwt. superphosphate	0 8 3 0 8 0 0 5 0	This block is practically situated on a clay pan, though patches of good soil exist. After heavy rains soil sets like cement. Crop from 1 ft. to 3 ft. high	17·3	19·33	18·3
10	½ cwt. dried blood ... ... 1 cwt. superphosphate ... ... 1 cwt. sulphate of potash	0 2 3 0 5 0 0 8 0	Remarks as applied to 9, but a greater percentage of good soil exists	20·3	19·33	19·8
11	Control (unmanured)	...	At the west end of this block some first-class soil is met with, which accounts for the little difference in yield. The crop on this soil would go fully 35 bushels to acre. The balance of block is similar to 10. Crop from 1 ft. to 3 ft. 6 in.	19·0	18·20	18·6
12	½ cwt. dried blood ... ... 1 cwt. Thomas' phosphate ... ... ½ cwt. sulphate of potash	0 2 3 0 4 6 0 8 0	The same remarks as applied to 11 apply to this, only more good soil is found at the west end. Height, 1 ft. to 3 ft. 6 in.	25·3	18·53	21·9
13	½ cwt. dried blood ... ... ½ cwt. sulphate of potash ... ... 1 cwt. superphosphate ... ... ½ cwt. Nitrolim (top dressing)	0 2 3 0 8 0 0 5 0 0 8 3	Remarks as applied to 12, only more good soil is found. Height, 1 ft. to 3 ft. 6 in.	24·8	19·9	22·3

SANDY SOIL EXPERIMENTS, NO. 2.

Cropped last season with wheat. Area, $\frac{1}{10}$ Acre. Variety, Bunge No. 1. Sown, 2nd June. Harvested, 2nd November. Top dressed, 19th August, with Nitrolim.

Block.	Manure Applied per Acre.	Cost per Acre. £ s. d.	Remarks.	Yield per Acre, 1911.	Yield per Acre, 1910.	Average.
1	Control (unmanured)	...	Crop very thin; straw from 18 in. to 30 in; straw clean. Soil practically raw; sand for 7 ft. in places	8·6	6·7	7·6
2	1 cwt. superphosphate	0 5 0	Crop in appearance same as No. 1	8·6	7·33	7·9
3	1 cwt. superphosphate ... ... ½ cwt. Nitrolim	0 5 0 0 8 3	Crop on raw sand to all appearance very little better than the two previous; on heavier much better. Height, 18 in. to 3 ft.	11·5	No experiment	...
4	15 tons stable manure	2 5 0	This block responded greatly to rain experienced in August; previous to that, was no better than unmanured. Height, 18 in. to 3 ft.	11·5	No experiment	...
5	1 cwt. superphosphate ... ... ½ cwt sulphate potash ... ... ½ cwt. Nitrolim	0 5 0 0 8 0 0 8 3	A finish of a land ran the whole length of this block, and germination did not take place until the end of August, which would account for reduction in yield on such a small area. Height, 18 in. to 3 ft.	10·8	8·25 ½ cwt. sup. instead of 1 cwt.	9·5

SANDY SOIL MANURIAL EXPERIMENTS, No. 3.

Bare fallow 1910. Area, &c., same as No. 2. Soil better in quality to a slight extent.

Block.	Manure Applied per Acre.	Cost per Acre. £ s. d.	Remarks.	Yield per Acre, 1911.	Yield per Acre, 1910.	Average.
1	Control (unmanured)	...	Crop very thin; heads short. 18 in. to 3 ft. high	7·5	Not sown	...
2	1 cwt. superphosphate	0 5 0	Remarks as applied to No. 1	9·1	,,	...
3	1 cwt. superphosphate ... . ½ cwt. Nitrolim	0 5 0 0 8 3	Crop thin; slightly better in appearance than 1 or 2. Soil little better than in those blocks	1·24	,,	...
4	15 tons stable manure	2 5 0	Crop much better in appearance than the first two. Soil better than in 3. A finish in this block reduced yield slightly, as well as presence of lucerne plants. Height, 2 ft. to 3 ft.	14·6	,,	...
5	1 cwt. superphosphate .. .. ½ cwt. sulphate potash... ... ... ½ cwt. Nitrolim	0 5 0 0 8 0 0 8 3	Crop good appearance. More lucerne was present in this block than in 4. Soil better than 4. Height, 2 ft. to 3 ft.	15·1	,,	...

STATE FARM WARREN, STANWELL.

WARREN'S CHAMPION AYRSHIRE DAIRY BULL.

The accompanying illustration represents the stud Ayrshire bull Spectator, now located at the Warren State Farm, Q.C.R. He is by the well-known Speculation of Whitehill (imp.), out of Lena (one of the best dairy cows at the college).

As animals of his class are rarely found in the country, I wish to draw the attention of the Central Queensland farmers to him, my object being to show to them the advantages that they could derive from sending their cows to him.

Although it is not a good photo. of Spectator, his general appearance will at once show that he is a very true specimen of the sire required for our district. One can see that he possesses beauty of form combined with constitution, and his length, breadth between the hind legs, straightness, and general squareness of form, combined with plenty of character, prove him to be a bull of rare standard.

When the department has gone to so much expense for the improvement of the dairy herds of Central Queensland, the least the dairymen can do is to avail themselves of the opportunity offered to them, and send their cows to the State Farm to be mated with this young sire. Very few dairymen thoroughly realise what a good sire means to a dairy, but a glance at the show and dairy records of the progeny of such sires as Glen Elgin's Bruce, Gordon, Jamie of Oakbank, &c., will convince the most sceptical of dairymen that the sire is of undoubted importance.

GINDIE STATE FARM.

7th November.

Drought conditions still prevailing here. Some nice showers have fallen in different parts of the district, our share of which was 81 points. From April to October we have had rain on five occasions, totalling 1.88 in. There is very little grass in the sheep paddock. The paddocks about the steading are also very bare. In the cattle and horse paddocks there is a fair amount of grass, though, of course, it is very dry. The horses and some of the cattle were mustered for inspection by His Excellency the Governor, who expressed much surprise at the excellent condition of the stock, considering the dry weather we have experienced, and the present condition of the grass. It is at a time like the present when one feels the benefit of feed that has been put by in more favourable seasons. The ensilage has been a grand standby for many months. Pigs, horses, and three or four cows, have eaten it with relish, but I regret to say there is not much of it left. We have started to use the bush hay, that has been on hand for some years. This will be put through the chaffcutter, at the rate of one sheaf of grass to two of wheaten hay. If the dry weather continues one sheaf of each will be put through, and the chaff damped down with molasses and water. Owing to the number of horses that have to be fed, we are using a large amount of feed.

Plate XVIII.

WARREN'S CHAMPION AYRSHIRE DAIRY BULL.

NOTES ON STATE FARM, WESTBROOK.

The manager reports that the weather, although not too good for experimental farming, has been a great improvement on the previous few months. A splendid shower fell on the evening of the 7th instant; 1.53 in. was registered. Two or three fairly hot days were experienced when the temperature in the shade on 13th instant registered 99.5 deg.

The potatoes planted last month are giving promise of a good crop. The soil is being well worked with the plough and scufflers. The constant working of the soil is keeping it friable, with a fair percentage of humus. There is no sign of potato disease of any kind making its appearance. However, as it is difficult to notice the commencement of some of the fungoid diseases, the two portions under potatoes were sprayed with Bordeaux mixture. The first sowing of 12 acres of Star Leeming maize has come up very evenly, and the scufflers are kept going between the rows to kill weeds and retain the moisture. All other crops are doing well considering the season.

Fruit.—The late dry spring has been very severe on some of our fruits, especially the large trees. During the winter a severe pruning back was carried out on the orchard, for the purpose of minimising labour by pruning and picking the fruit from the ground, instead of climbing up ladders, and also to improve the quality. To make sure of a crop, trees of all the varieties of stone fruits were left large, with the usual pruning, as stand-bys, in case the season might not be favourable to the trees hard cut back. The cutting back is showing a splendid object lesson in the orchard. The trees left are a decided failure, the season being too dry; the sap did not rise sufficiently in the trees to burst open the buds, with the result that on many of the trees there is little or no fruit, and any that there is is of poor quality, while all the trees cut back that were expected to fruit this season are in splendid order, with good crops of splendid fruit. Two hundred trees are to be covered with net to protect the fruit from fruit fly; two hundred trees of equal quality and varieties will be marked and left uncovered, and notes taken from day to day, until the fruit is marketed, when the commercial value of the experiment will be noted, so that it may be of commercial use to orchardists and farmers for next season.

Vineyard.—There is every appearance of a splendid crop; the vines are healthy, neatly tied up, the ground is clean, and the 17 acres of vines on the slope near the avenue have a very fine appearance.

STATE FARM, HERMITAGE.

MAZZAGUA AS A FODDER IN FIELD AND SILO.

The manager of the State Farm, Hermitage, writing of his experience of mazzagua as a fodder crop, says:—As a fodder crop mazzagua is little known to the dairyman and agriculturalist of this State. It is a prolific grower under reasonable, favourable conditions and a heavy yielder of a green, succulent fodder. When conserved as ensilage, it produces feed equal to or better than any of the improved varieties of sorghums. The seed of this plant was originally procured by the Department of Agriculture and Stock from the West Coast of Africa a few years ago, and was then grown in various parts of the State on small areas, but no attempt was made to grow it extensively, and it eventually almost passed out of notice as a fodder crop. In the month of September, 1907, a small quantity of seed was procured by the manager from the Springsure district, where it was reported to have

grown exceedingly well. The seed obtained was planted at this farm and produced a vigorous growth, which, however, did not produce seed during the first season. The crop was harvested and the stools were protected from the frost with an earth mulch by hilling up the drills with the plough. In the following spring it made an early and vigorous growth, and attained a height of over 12 ft. in four months. The crop was allowed to mature with the object of procuring seed, but it proved to be a very shy seeder and only a small quantity was obtained. This was planted on heavy black soil typical of this portion of the Downs, on 19th November, 1909, in drills 4 ft. apart and seeded sparsely. On 26th November it was well above the ground, and maintained its characteristic as a vigorous grower during the summer months and towards the end of March. It then stood an even crop averaging over 12 ft. in height. At this stage it did not give any evidence of going to seed, and it was decided to cut it for ensilage. It was chaffed and placed in the fibro-cement silo. The yield of green mazzagua was 27 tons 17 cwt. 2 qr. per acre. The silo was opened for winter feeding and the mazzagua was found to have a good aroma, the silage being of a fresh green colour. This was greedily eaten by all stock. A portion of the content of the silo consisted of varieties of sorghums and it was noticed that the stock ate more greedily of the mazzagua than of the sorghum portion, although the sorghums produced a good quality of silage. During the winter of 1910, the stools were protected with an earth mulch as previously described. In the following summer a crop equal to the previous one was produced from the old stools. Towards autumn the crop gave evidence of seeding freely, and a quantity of fair quality seed was obtained. Last winter, which was a very severe one, the stools were again protected as in previous winters and withstood the trying climatic conditions, making nice green growth in the early spring. At present, the dryness of the season has checked its growth, but it has not suffered to the extent of other crops which are looked upon as drought-resisting. From the experience thus gained of this crop as a standby it should receive more attention by dairymen.

FRUIT AT HERBERTON.

(*See* under General Notes, page 314.)

IRRIGATION AT THE AGRICULTURE COLLEGE.

In submitting the following details in connection with the irrigation carried on here, I should like to point out that the cost of fuel (owng to the scarcity of firewood on the College property) was rather high, which, together with extra labour in cutting the wood and firing, brought the cost of elevating the water to the creek's bank much beyond what it could be done for under more favourable circumstances. When the suction gas plant, now in course of erection, is brought into use, the cost may be reduced by at least 60 per cent. The water is elevated from the Lockyer Creek, the height from the water's edge to the top of the bank being 58 ft. The pump used is an eight-inch centrifugal, which is worked by a 20-h.p. high speed engine and a 16-h.p. boiler. The water is conveyed to the land intended for irrigation by means of surface drains. The land to which the water was supplied had been graded and laid off in half-chain sections, the centre being raised to what is known as a " crown," high enough to allow a distribution of water on both sides. A drain is formed in the centre of each crown by means of a double-mouldboard plough, from which the land is easily flooded on both sides by blocking the water at short sections. The field is first worked by means of a disc cultivator, which opens the crowns of the lucerne plants and causes them to spread

and grow more rapidly, also filling the cracks in the soil. The water is carried to the lower part of the field when the work of distribution is commenced. By this means the workers are the greater part of the time on dry land. The man in charge of the distribution of water must use a little brains with his work, otherwise the flooding may be overdone, which means that if too much water be allowed on the land the lucerne will perish. The first watering was commenced on 17th August, and applied at the rate of 2½ inches of rainfall. Four days after watering, the spring-tooth harrow was brought into use, which was done for the purpose of loosening the caked surface. The second watering was commenced on 5th September, and applied at the rate of 1½ inches per acre. Harrowing was resorted to when the land was dry enough to carry the teams. The third watering was commenced on 18th September and applied at the rate of 1 inch to the acre. The harrow was not made use of after this watering because of the high growth of the lucerne. It will be observed the first application of water was costly because of the loss by soakage in the drains and the cracks in the ground brought about by the continued dry weather. Cutting the crop was commenced on 24th September, the results of which were as follow:—

Cost of irrigation: Area, 41¼ acres.

	£	s.	d.
Cutting and carting firewood	£23	2	0
Three men, forty-eight days	24	4	6
Ploughing and opening drains	3	0	0
Oil	1	8	0
Total cost	£51	14	6

Garden plot No. 3, 17½ acres, was irrigated at a cost of £21 18s., and the weight of lucerne harvested was 25 tons 3½ cwt., which, at the rate of £5 per ton, means £125 17s. 6d., leaving a profit of £103 19s. 6d.

Garden plot No. 2, 13¾ acres, cost £17 4s. 2d. to irrigate. The weight of lucerne harvested was 14 tons 7 cwt., which, valued at £5 per ton, equals £71 15s., leaving a profit of £54 10s. 10d.

Farm plot No. 1, 5 acres, cost £6 2s. 3d. to irrigate. One and three-quarter acres of green barley and oats were harvested for a return of 6 tons 12½ cwt., the value of which, at 30s. per ton, equals £9 18s. 9d. The 1¾ acres referred to cost £2 2s. 8d. to irrigate, leaving a profit of £7 16s. 1d.

SUMMARY.

Cost of Irrigation.	£	s.	d.	Returns from Irrigation.	£	s.	d.
17½ acres cost	21	18	0	25 tons 3½ cwt., value	125	17	6
13¾ " "	17	4	2	14 " 7 " "	71	15	0
1¾ " "	2	2	8	6 " 12½ " "	9	18	9
Total cost	£41	4	10	Total return	£207	11	3

Total profit, £166 6s. 5d.

I may point out that careful daily records were kept of all expenditure in connection with the work. It may be noticed that no allowance is made for wear and tear, the value of the land, or cost of planting lucerne crop, some of which was planted some years ago. It must be borne in mind that a second cutting will result from the watering already referred to; if this be taken into consideration, the cost of production will be materially reduced. In the case where green lucerne was fed to stock, the usual allowance was made between the weight of the green material and that of matured hay—viz., 1 ton of hay to 5 tons of green lucerne.

The Orchard.

REMARKS CONCERNING A RECENT VISIT TO TOOWOOMBA ORCHARDS.

By CHARLES ROSS, Instructor in Fruit Culture.

During the October month I made two excursions to Toowoomba, and inspected twenty-five orchards and fruit gardens. The conclusions arrived at are very varied in character. There are some well-kept places in which cultural methods, cleanliness, supervision of pests, &c., are persistently and thoroughly carried out, with results that are not excelled in any part of the State; but other places I visited are carelessly and indifferently kept. Several partially or wholly abandoned orchards are an actual menace to the progressive and would-be orchardist. An oft-repeated rule of my own is, "Don't grow fruit trees for fun." Before fruit-growing is to become the success it ought to be in a State like Queensland, the industry should be entered upon with as much zeal and determination as any other branch of farming, which in a great measure are wanting.

The conditions of soil and climate in the neighbourhood of Toowoomba are such that everyone possessing a piece of land is tempted to plant all and sundry, without considering the attention absolutely necessary for their future well-being. In some gardens overcrowding is very noticeable. The idea of having a bit of everything is not the successful fruitgrower's objective. It is far better for each grower to specialise one, two, or three varieties rather than experiment with every subject that comes under his notice. This remark applies to private gardens as well as to commercial orchards. As the number of subjects is reduced, so also are the labour and attention required, especially in the subjugation of fungoid and insect pests.

It is abundantly proved in the Toowoomba district that the industry pays handsomely those who have devoted their whole attention to grapes or citrus growing. These remarks will eventually prove true with various other fruits, but cannot be said with equal force of mixed orchards. I don't know of any district where finer and better quality apricots can be grown or even equalled. Most peaches and certain varieties of plums are also well grown, but with the two latter, the great trouble to contend against is the fruit fly, and many people have despaired of growing them satisfactorily, and are sitting back for the Diseases in Plants Act to be rigidly enforced. The size and colour of table grapes grown in the district are excellent, but the greatest deterrent to a highly-developed flavour with a maximum amount of sugar contents, is the objectionable practice of close planting and excessive shortening in of summer growth. In my opinion, this district is particularly adapted for growing apricots, lemons, and table grapes, and, with an increasing demand, quick transit, and improved methods of curing and packing, these fruits will be largely specialised in the future.

A more detailed report of the orchards and gardens visited has been submitted to the department, extracts from which have been furnished to those interested.

NOTES ON BUDDING AND GRAFTING.

Since the publication of Mr. Wester's paper last October on "Shield-budding the Mango," a fair amount of interest appears to have arisen on the subject of budding and grafting generally. The following paper by Mr. A. F. Macmillan, Curator, Royal Botanic Gardens, Ceylon, published by the Ceylon Agricultural Society, has reached us per medium of the "Tropical Agriculturist." It contains in a nutshell the information which is being sought by many beginners in fruit-growing:—

Grafting.

Grafting consists in placing together two cut surfaces of one or of different plants in such a way as to cause them to unite and grow together. The plant on which the graft is inserted is called the *stock,* and the part inserted the *scion.* The action of the one on the other is frequently marked and very important. Some fruit trees, for instance, grow freely on a certain stock, but will scarcely bear fruit; whilst on another stock they produce abundant crops, though they may not grow so vigorously. The possibilities of grafting are of the greatest importance in horticulture, more specially in fruit-growing industries, and through its medium trees and shrubs, &c., may be propagated when other reproductive means are of no avail. Among other advantages of grafting are the good qualities of the scion are retained; seedling fruit trees are brought more quickly into bearing by being grafted on fruit-bearing stocks; and in some cases the two sexes of monœcious plants may be brought together on one stock in order to ensure their reproduction by self-fertilization. In Ceylon, however, as in most tropical countries, grafting is seldom practised.

Certain conditions are essential for successful grafting. The scion and stock should have a natural affinity to each other, either as varieties, species, or genera of the same natural order; also the natural vigour of the stock and scion should be somewhat similar. The operation should be carried out in the shade, and protected from the sun until the union is complete. In all cases it is necessary to exclude the air from the graft by covering it with grafting wax or clay, bound round with matting or fibre. A fundamental principle is the necessity of forming a direct communication between the layers of inner bark (*cambium*) in the scion and stock; the pithy or woody parts do not unite. There are various methods of grafting that may be practised, according to the size and variety of the subject it is intended to propagate or improve, and each method may be varied to some extent. The following are those most generally used:—

Whip or Tongue-grafting.—This is one of the best methods, and is extensively practised in cool countries. The stock is cut in a sloping direction, just above the node. The scion is then similarly cut through obliquely; a thin tongue is cut in this in an upward direction, and a corresponding cut made in the stock; the scion is fitted into the latter so that the inner barks of stock and scion come in contact with each other. The graft is then bound firmly to keep the parts in position, and covered with clay or grafting wax for excluding the air.

Cleft-grafting.—The stock is split open by a chisel, and the scion cut wedge-shaped and fitted in the cleft, so that the inner barks may meet each other. This mode has obviously certain objections, and is chiefly adopted for plants with old stocks.

Cleft-grafting.

Saddle-grafting.

Crown or Rind-grafting.

Saddle-grafting.—In this the stock and scion must be of nearly equal thickness, as the former is cut sloping on each side, like a wedge, and the latter is split up the centre and thinned so as to allow of its fitting accurately on top of the stock. This method is suited to shrubs and young-wooded plants.

Wedge-grafting.—This is the same as the preceding plan, with the position of parts reversed.

Crown or Rind-grafting is applied to trees of considerable size. A scion, about 6 in. long, is selected; the lower half is cut in sloping direction, and the notch or shoulder formed in cutting it is made to fit on top of the stock. It is then inserted between the bark and wood. This can only be done at the commencement of the growing season, when the bark and wood easily separate.

Side-grafting consists in inserting scions without cutting away the head of the stock. It is useful for supplying, where deficient, a branch or stem to any part of a tree. The scion being splice-cut and thinned out is inserted under the bark, the union being bound up and covered with clay or wax.

Veneer-grafting is chiefly used for propagating trees and evergreen shrubs. The scion is cut with an even splice-cut about 1 in. long; a corresponding quantity of bark is taken off the side of the stock: both are then fitted together, without a cleft or incision being made in the wood.

Grafting by Approach or Inarching.—This is the best system of grafting known, and natural examples are frequently seen in trees growing together. It is specially suited to the tropics, and is successfully applied to mangoes and other fruit trees. Nutmeg, cacao, coffee, &c., may also be propagated in this way. The scion in this case must be grown in a pot or bamboo, so as to be movable, or planted close to the stock. In the case of large trees which it is desired to increase in this way, a temporary platform may be erected near the tree, upon which the scion-plants in pots are placed; the shoots of the tree may thus be easily bent down to reach the scion. The mode of procedure for inarching is to remove a similar portion of the wood from both the parts intended for joining; these must then be carefully fitted together and secured with tying material and a bandage. When the parts have united, dissever the union from the parent plant below the bandage. The grafted plant must be kept in a shaded place until it has commenced active growth, and stock and scion have become thoroughly incorporated.

Herbaceous-grafting is applicable for increasing plants when still growing. It has been applied with success in growing the melon on the

Side-grafting.

Inarching.

Herbaceous-grafting.

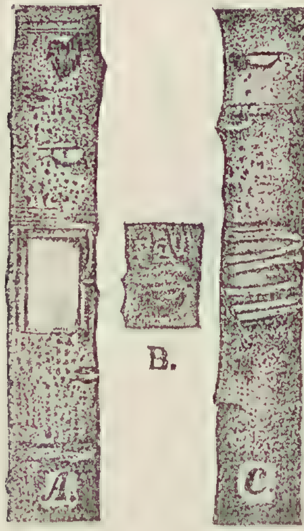
cucumber, the tomato on the potato, &c. The stock and scion being nearly similar in texture, the former is carefully split, and the scion prepared wedge-shaped and inserted rather deeply, allowing the barks to coincide, as in all other methods. Tie with worsted, cover the cut with grafting wax, and shade from the sun.

BUDDING.

This process, which is a species of grafting, consists of taking an "eye" or bud attached to a portion of the bark and inserting it in the stem or branch of another plant. A condition necessary to success is that the sap is in active circulation, so that the bark may detach itself readily when gently lifted from the wood. This is found to take place

Grafting Knife.

best where very marked seasons of growth or "flushes" occur. In equatorial regions, where the seasons are not so marked as in temperate countries, the operation of budding is not always successful. There are various forms of budding, each adapted to particular circumstances, as shield or T-budding, flute or tube-budding, and annular or ring-budding. The firstnamed form is the one chiefly practised for roses and fruit trees. The *modus operandi* is thus. Select a shoot well furnished with plump dormant buds from the plant desired to be increased; cut off the leaves at half of the length of the leafstalks. Remove a bud from the shoot by entering a knife half an inch below the bud, between the inner bark and the wood, sloping the knife outwards above the bud. The small portion of wood taken with the bud is carefully removed. In the mark of the young shoot in which the bud is to be inserted make an incision in the form of "T." Raise the bark carefully, push the bud gently into the opening, bind it securely to exclude air, leaving only the point of the bud exposed. Dull cloudy weather and morning or evening are the best time for budding, and the operation must be performed as quickly as possible, as both bark and bud are injured if exposed to the air for any length of time. Special knives are supplied for the purpose, and an instrument known as the "bud-transplanter" is also employed.

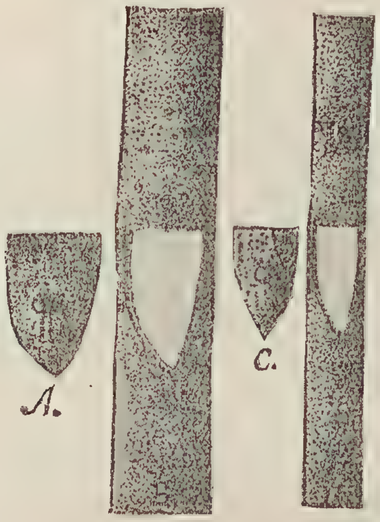


Rectangular Patch Budding.

Firminger said: " In the Upper Provinces of India budding is performed with great facility at two seasons of the year; but, for some reason I am unable to explain, I have not found such to be the case in the vicinity of Calcutta, where budding can so seldom be performed with success that it is rarely or never attempted, inarching being uniformly adopted instead." Mr. Fawcett, retired Director of Botanic Gardens, Jamaica, recommends budding as a quick way of establishing a mango orchard in that country. Mr. Harris, of Jamaica, has been successful in budding cacao, and found that the Criollo and Calabacillo thus " gained enormously in vigour and productiveness." Budding is applicable to various kinds of fruit trees. In the West Indies it is claimed to have been " so successfully applied to the nutmeg trees, the grafting of which has not proved practicable, that the sexes of these may now be brought under the control of the cultivator." In regard of budding mangoes, the secret of success is said to lie " in taking the buds from about the middle of the growing shoot where they are well developed, and yet not too tender, at a time just prior to a vigorous stage of growth in the tree to be budded."

Bud-grafting.—In Queensland and the Southern United States this form of budding has of late been adopted with great success in the propagation of the mango. It is considered to be much more rapid than " inarching" or " grafting by approach," and does not, like the latter, involve the erection of a structure laden with pots around the tree which is to be multiplied. As applied to the mango, the mode of procedure is thus described: Seedlings two to three years old, with stems about an inch in thickness, are selected for stocks. A rectangular piece of bark is removed from the stock, and in its place is inserted a piece similar in shape, with a bud in the centre, taken from the variety of mango which it is desired to propagate. The bud-wood (*i.e.,* the shoot from which the bud is taken) should be not less than two years old. Precision in fitting the bud bark with the incision in the stock are important factors for success. A small quantity of grafting wax should be smeared over the edges of contact, and the bark then tied firmly with strands of bast, as

shown at C in the accompanying figure. After this the graft (excepting the bud) should be covered with strips of cloth dipped in melted paraffin wax, as a further preventive against the admission of air and moisture between the cut surfaces of stock and scion. If unduly exposed to the sun, shade should be provided by means of strips of paper tied over the bud. After union of stock and scion has taken place (which should be in two or three weeks), the bandaging should be removed, and the stock pruned back.



Bud-grafting of mango as employed in Florida.
(After the "Agricultural News.")

Grafting clay is a composition for covering the graft to exclude air and moisture until a union of the stock and scion is affected. It consists of two parts of clay and one of cowdung. These ingredients should be beaten together and thoroughly mixed until the consistency of fresh putty some time before being required.

Grafting-wax.—This is employed in grafting small or delicate plants, where the use of clay is scarcely practicable, but may also be applied to large plants, if desired. It is of various forms, and may be purchased in boxes from seed men. To make grafting-wax, melt slowly together one part of linseed oil or tallow, one of beeswax, and four of resin. For use, remelt in a gluepot, and when the wax is of consistency to work freely, apply with a small brush.

Tropical Industries.

PREPARATION OF VIRGIN FOREST LANDS FOR CANE-GROWING.

By A. J. GIBSON.

Inspection and Disposal of Timbers.

Before commencing clearing operations, a careful inspection should be made of the timbers upon the land intended for cultivation. Their suitability for sawmill timber, fencing material, yards, stables, tramway sleepers, firewood, &c., should be well looked into. Material for the above purposes is becoming very scarce in some localities, and too frequently a reckless waste of those timbers is noticeable. Firewood is required in fairly large quantities at most sugar mills, and the revenue derived from this source by the selector often materially helps him in the initial stages to purchase the necessaries of life. If there is a market for sound log timbers in the locality they should be disposed of. If not, the sound trees of large circumference should be ringbarked to prevent them from shading the cane plants.

Clearing.

Other timbers not required for fencing, &c., should be taken out and burned. If there is a heavy coating of grass on the land, and it is dry, a fire is generally run through. The next operation is known as grubbing, to remove stumps and trees. In some cases a mechanical appliance is used for pulling out trees and stumps. The main roots are severed; a steel wire hawser is attached to the upper part and connected to an implement standing well out of reach of the falling tree: The power is then applied, and the tree is hauled to the ground. The method chiefly adopted is to dig well round the trees and stumps. The hole is made large enough to allow of working space, and deep enough to allow of the tap root being cut off well below the reach of implements used in the subsequent cultivation. The side roots are also cut and dug out. Care should be exercised in this latter operation to remove all the roots near to the ground surface so that no injury is likely to occur to ploughing implements.

In most cases where the timbers are dry, the stumps and trees large, and the tap root difficult to get at, a fire is applied in the hole. The fires should receive frequent attention, and the utmost caution taken when approaching trees which have only been partially burnt out. For the inexperienced man, it is safest when dealing with large trees such as those mentioned to first cut the tree down by axe or crosscut saw, and then remove the stump.

After the useful timbers have been disposed of, and the stumping and burning off completed, the stump holes are filled in with soil. The land is now ready for the plough.

Ploughing.

It is usual at the first ploughing to plough shallow, the object being to cut the roots of the grass and not to cover up too much. The harrows then are used to break the clods and rake the grass to the surface. Where land is infested with couch grass it should be well harrowed to remove it. It is useless to bury couch grass with the object of getting rid of it.

The second ploughing is usually known as cross ploughing; the furrows are run at right angles to those of the first ploughing; the depth is

increased by this ploughing. The land should be again well harrowed to break clods and bring the soil into a good state of tilth. If the land turns up hard and cloddy, a heavy roller is sometimes used to advantage.

In the third ploughing the depth is further increased, until a free soil of a uniform depth of from 9 to 10 inches is obtained. It is not customary in new lands to cultivate too deeply for the first few crops. In some cases a fourth ploughing is found necessary, but this is rare, and more especially so if the land has been worked up under favourable conditions.

RIDGING AND DRAINAGE (SURFACE).

When the farmer has decided that the tilth is good enough he must satisfy himself as to what effect excessive rains are likely to have upon the land, and if it is necessary to provide for surface drainage, to allow of the excess of water getting away freely. Porous subsoils usually do not require much drainage. On the other hand, low-lying fields, with a stiff clayey subsoil, need draining. In making provision for this factor the general lay of the land should be taken into consideration. Drains with too great a fall carry away too much soil during heavy rains. The process known as ridging is followed, and the land worked up into beds of varying widths. Between each bed a space is left, which forms the water channel. The centre of the bed, or the crown of the ridge, is the highest part, and from that point to each water furrow the land slopes away gradually.

Opinions vary as to the number of rows required to each bed. From personal observation, the writer is of the opinion that the 10 or 11 foot wide bed offers decided advantages, in that it assists materially, in a fairly inexpensive way, in solving the problem of burying the trash, thereby enriching the soil in organic matter and improving the mechanical condition of the same. Two rows, either 4 or 5 feet apart, are placed upon the crown of the ridge, leaving a space of 6 feet between the outer rows of each bed. When the cane is being cut the tops are thrown into the water furrow; afterwards the trash is also drawn in. This covering prevents weeds from springing up; and in the course of time the trash rots and can be made into a mulch with the soil. In the wet season the water channels should be opened up to allow of the easy get away of surplus rainfall. The method above described is now being used by a number of farmers with success, and comparatively poor soils have been much improved by these means. It is not deemed advisable when following this method to have the rows too long; and it is well to scoop out the headlands to carry off the water to a main channel leading out of the paddock. These channels should have just sufficient fall to prevent water from lodging in them.

PLANTING.

The cane plants, each containing three healthy eyes, are placed 6 inches apart in the drill. If ridging is not considered necessary the drills are drawn out by a double mouldboard plough and placed 5 feet apart. The plants are placed as above described. Care should be taken to see that a small layer of loose soil remains in the bottom of the drill; after which the plants are lightly covered. When planting in dry times, up to 3 inches of loose soil is placed over the plant, to ensure a good supply of moisture for germination. As the plants strike and come away, more soil is gradually thrown into the drill by means of a scarifier or scuffler. This is necessary as the plant grows, and cane begins to form, fresh eyes germinate below the ground surface, and the stool is increased in size.

The crop is cultivated with light horse implements between the rows until they are well covered in by the growing cane. Chipping is also carried out in the spaces between the cane in the drills. In the early stages much of this latter operation can be done by specially constructed implements, worked by horse. The implement requires skilful manipulation to avoid injury to the plant.

PREPARING SCRUB LANDS FOR THE PLOUGH.

In a previous article the subject matter of planting cane in new scrub lands was dealt with. The stumps of scrub trees as a rule decay quickly, but there are some of them which remain in the ground for a long time without rotting. After the first crop of cane has been removed, and the trash burnt off, the decayed stumps and roots should be removed. This method should be repeated, if time permits and no injury is done to the cane, after each crop of cane is removed, so that not much remains to be done when the time comes for ploughing out the stool and renewing with a fresh plant.

The same remarks apply equally in this case to those made concerning the clearing, &c., of virgin forest lands.

THE NEED FOR AGRICULTURAL COLLEGES IN TROPICAL COUNTRIES.

In the article on "The Coming Boom in Cocoanuts," which we take from "Tropical Life," London, for August, 1911, the need for a thorough education in tropical agriculture for those young men who propose to settle in the tropics and engage either in the cultivation of such products as rubber, cocoanuts, coffee, cacao, &c., or as managers of estates, is strongly emphasised. A very large portion of Queensland is purely tropical, and there are extensive areas, not only on the mainland but on the numerous islands which stud the coast from the Palm Island and Hinchinbrook northwards (on many of which cocoanuts were planted years ago, but which have since disappeared), where cocoanuts would thrive as well as in Papua, the Solomons, Ceylon, or Malabar. Rubber thrives in North Queensland, and most surely the day will come when these and other tropical products will be grown on a commercial scale in the North. The question then arises: Who is to undertake to manage such estates? Assuredly not men who have devoted all their attention to the cultivation of cereals, root crops, &c., in the temperate or even in the sub-tropical regions of the State. The demand will be for men who have made tropical agriculture a life study, and that under white labour conditions. The successful manager of a rubber or cocoanut plantation in Papua, the Solomons, or Ceylon, would almost certainly be a failure in North Queensland or anywhere in Tropical Australia, seeing that labour, food, and climatic conditions are incomparable with similar conditions in countries where coloured labour is employed. Hence the need for a pure tropical agricultural education of young men, which means the establishment of a tropical agricultural college. In Queensland we educate young farmers at the Agricultural College and at some of the State farms, and they leave these institutions fully equipped for a farming life in so far as it is concerned with the products of a temperate climate, and also for dairy farming, but of tropical agriculture and tropical conditions they naturally know nothing. Yet it is to these young men that we look for the development of tropical Queensland.

Botany

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

Order LEGUMINOSÆ.

TRIFOLIUM, Linn.

T. tomentosum, *Linn.* Stem procumbent. Leaflets obcordate, cuneiform, sharply serrated, stipules lanceolate, acute, scarious. Heads of flowers globose, on very short peduncles; bracteas small, lanceolate; flowers purplish, sessile; calyx inflated after flowering, membranous, reticulated, tomentose, the segments shorter than the corolla. Legume seeded; seeds irregularly cordate, green, shining.

Hab.: A native of Southern Europe, lately met with as a garden weed at Rosalie, near Brisbane, by Mr. H. W. Thurlow.

Order POLYGONACEÆ.

* EMEX, Necker.

Flowers monœcious. Male flowers: Perianth-segments 5, equal, spreading. Stamens 4 to 6. Pistil rudimentary. Female flowers: Perianth with a triangular turbinate tube and 6 lobes, enlarged and hardened in fruit, the 3 outer lobes corresponding to the angles of the tube rigid, spreading and spinescent, the 3 inner ovate, erect, and connivent over the fruit. Ovary small, 3-angled, styles 3, short, with large fringed stigmas. Herbs. Leaves ovate. Stipules brown and scarious, sheathing but soon loose and torn or jagged. Flowers in whorl-like clusters, the females axillary, the males distant on axillary peduncles, the lower clusters including sometimes a few females. A South African and Mediterranean genus.

E. australias, *Steinheil.* Stems diffuse, rather thick; 1 to 1½ ft. long, glabrous as well as the whole plant. Leaves on long petioles, broadly ovate, very obtuse, truncate or broadly cordate at the base, 1 to 2 in. long. Fruiting perianth very hard, triquetrous, 4 to 5 lines long, with 3 rather long rigid thick spinescent and divaricate lobes, the 3 inner ones short, broad, erect, obtuse or mucronate.—*E. centropodium*, Meissn. A common maritime plant in South Africa, differing slightly from the Mediterranean species. *E. spinosa*, Campd. *Benth., Fl. Austr.* V. 262. Introduced into South Australia in the forties. Mr. J. Medley Wood, in his *Natal Plants*, IV., Pl. 360, gives the following note on the plant above noticed:—"A troublesome weed in Natal, known as 'Devil's Thorn.' Mr. Andrew Smith, M.A., in his work on the Medicinal Plants of the Cape Colony, says of this plant: 'The leaves are boiled and used as a cabbage in biliousness, and also for creating an appetite. They are mildly purgative and diuretic.'"

Hab.: Naturalised in and about St. George, *G. P. Barnes, M.L.A.*

Order CYCADACEÆ.

MACROZAMIA, Miq.

M. mountperriensis, *Bail.* Figures are here given (Plates XIX., XX.) of both the male and female plants of this most elegant species. Most, if indeed not all, the species of the genus are dangerous to stock, but for ornamental purposes few are superior, and the one under notice is particularly beautiful and has not previously been figured showing the inflorescence of both sexes. For the present specimens we are indebted to Mr. A. Cameron, Mount Perry.

Order ORCHIDEÆ.

DENDROBIUM, R.Br.

D. undulatum, var. **Carteræ,** *Bail. New var.* (Plate XXI.) This unique yellow variety was found by Mrs. T. W. Carter when living some few years ago on Pine Islet, Percy Islands, and the plant was sent to her brother, Mr. H. Barwick, of Paddington, Brisbane, in whose bushhouse it has flowered for the past two years, and he has now presented the plant to the Brisbane Botanic Gardens, where it will have more room to develop.

The plant in no wise differs from the normal form except in the inflorescence. The racemes with peduncles are about 10 in. long and erect, and so far as known do not have that tendency to droop of the other forms. Flowers are a canary-yellow and when fully expanded slightly exceed 1½ inch. The segments are wavy but only slightly twisted. Labellum all yellow except the disk-plates, which are prominent and usually white.

Order FILICES.

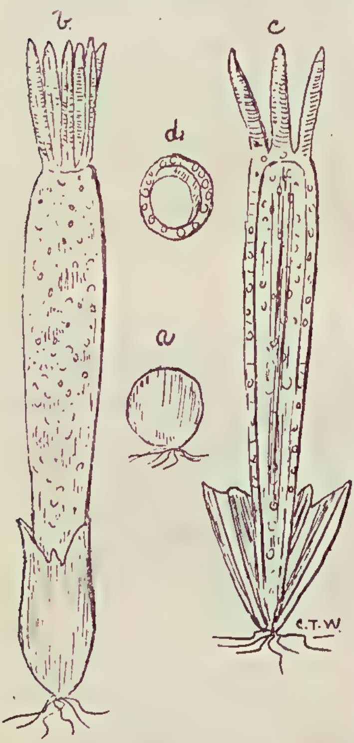
POLYPODIUM, *Linn.*

P. rigidulum, *Sw.*, var. **Whitei,** *Bail. New var.* (Plate XXII.). This very distinct and beautiful variety has somewhat the appearance of *P. r.* var. *Vidgeni*, Bail., but the fronds have much broader and more deeply divided leaflets. The characteristics of the plant will readily be seen from the photograph and drawing, reproduced herewith, taken from plants cultivated in the Brisbane Botanic Gardens. Collected at Glasshouse Mountains by C. T. White (Field Naturalists' Club, Excur., May, 1910.)

Order FUNGI.

LYSURUS, Fries.

L. tenuis, *Bail. sp. nov.* Whole plant 2 to 4 in., of a dirty white. Receptacle divisions 6, narrow, linear, quite free, erect, 5 to 9 lines long, rugose, angular, bearing the sporiferous pulp. Stem cylindrical, about 2 in. long, transparently blistered and minutely perforated, volva ovate, about 8 lines long, torn into teeth-like lobes, marked on the inside by the impression of the receptacle-lobes like others of the genus.



Hab.: Found growing in a bushhouse at Toowoomba by Mr. H. A. Longman. The colour of the gleba was not noticed on the living plant. (*a*) Young plant, (*b*) mature plant, (*c*) long section of a mature plant, (*d*) trans. sect. do.; all natural size.

Plate XIX.

A MALE PLANT OF MACROZAMIA MOUNTPERRIENSIS, *Bail.*

Plate XX.

A Female Plant of Macrozamia mountperriensis, *Bail.*

Plate XXI.

DENDROBIUM UNDULATUM, *R.B.* var. Carteræ, *Bail. n. var.*

(*a*) top leaves and raceme (reduced); (*b*) dorsal sepal; (*c*) lateral sepals; (*d*) petal; (*e*) labellum—side view (*f*) labellum—laid open; (*g*) plates.

Plate XXII.

Polypodium rigidulum, *Sw.*, *var.* Whitei, *Bail. n. var.*
(*b*) A single pinna, natural size. (*c*) Portion of pinna enlarged to show veining.

BRISBANE BOTANIC GARDENS SECTION.

By J. F. BAILEY, Director.

Queensland gardens are noted for the many beautiful flowering trees, shrubs, and climbers, which luxuriate in a climate so admirably adapted for their growth.

Some very fine specimens of the latter class have been blooming during November, while others promise to furnish a similar display during this month. In the Brisbane Botanic Gardens may be seen a very good collection, and attention may be drawn to the following, the propagation of which, unless otherwise stated, is readily effected by cuttings. The so-called Chinese Jasmine (*Trachelospermum jasminoides,* syn. *Rhynchospermum jasminoides*) was a splendid sight during the first three weeks in November, as the accompanying illustration will show. This Chinese species is of close-growing habit and has glossy foliage which assists in setting off the abundant supply of pretty white blossoms, the latter having an additional attraction in possessing a pleasing fragrance.

Antigonon leptopus is a Mexican plant which furnishes a wealth of pink flowers throughout the summer months. It is a quick grower and is readily raised from seed. There are several varieties of this handsome climber, differing slightly in shade of colour, while one has undulate leaves, which adds considerably to its beauty.

Thunbergia grandiflora and *T. laurifolia* are two strong-growing Indian plants with large handsome funnel-shaped flowers. The flowers are almost identical in shape and colour (purple) but the leaves differ, those of the former being lobed and of the latter oblong or laurel-leaved.

Solanum Wendlandi, a native of Costa Rica, is of robust growth. The large masses of lilac-blue flowers which it bears during the summer months have earned it a high place in the gardener's esteem. *S. Seaforthianum* is a lighter growing West Indian species, its numerous lilac flowers being succeeded by red berries which greatly enhance the attractiveness of the plant.

Bignonias and Tecomas give us quite a number of gay-flowering climbers. The Bird's Claw (*B. Tweediana*), with its large yellow flowers, was recently an attractive sight, and *B. Lindleyana,* with its glossy leaves and masses of mauve-coloured flowers, has been in flower for some weeks past. (Propagated by means of cuttings or seed.)

B. venusta, with its drooping orange-crimson blossoms, furnishes a blaze of colour during our winter months. Among the Tecomas mention may be made of the pretty indigenous species, *T. jasminoides,* a light growing plant with flesh-coloured flowers, streaked with red in the throat. A beautiful white-flowered variety of this species has recently flowered for the first time with us. The deciduous species *T. grandiflora* and *T. radicans,* the so-called Trumpet Flower, are noble plants with orange-scarlet flowers and handsome foliage.

Most of the Ipomoeas, or, as they are commonly called, Convolvulus, are worthy of cultivation, and one of the handsomest is *I. Horsfallae,* with its rich deep-rose coloured flowers, which are borne in profusion from December to June.

The beautiful "Purple Wreath" (*Petraea volubilis*), a tropical American species, is now in fine flower, as is shown in the accompanying illustration. Portion of the flower (the calyx) remains on the plant for a considerable time after the other part (the corolla) has fallen. It flowers at various intervals throughout the summer months.

A recent introduction among the Buddleias has furnished a welcome addition in *B. Veitchiana,* a strong-growing climber which during November and December is arrayed with racemes of attractive lilac-coloured flowers.

The Golden Vine (*Stigmaphyllon ciliatum*) is a rapid growing Brazilian creeper with handsome leaves and clusters of pretty yellow flowers.

Among the most noteworthy of the trees now in bloom in the Gardens attention may be made to the following:—

Brownea grandiceps, a Venezuela species with large heads of reddish-coloured flowers. The foliage is not the least handsome part of the plants, being of a brownish colour when young, and produced in drooping bunches, which expand in the form of a fan as they mature.

Butea frondosa, or "Pulas-tree of India," is a deciduous tree somewhat resembling, in foliage, an Erythrina, with gorgeous masses of bright orange red flowers.

Cassia fistula, the so-called "Indian Laburnum," is a magnificent sight during December, January, and February with its long drooping racemes of golden-coloured blossoms.

Lagunaria Pattersoni, a large tree of our Northern parts on which Hibiscus-like flowers of a light-pink colour and about 2 inches across are produced in great profusion.

Times of Sunrise and Sunset at Brisbane, 1911.

DATE.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·4	5·33	5·29	5·47	4·59	6·5	4·46	6·28
2	6·3	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·2	5·34	5·27	5·48	4·57	6·6	4·46	6 29
4	6·0	5·35	5·26	5·49	4·57	6·7	4·16	6·30
5	5·59	5·35	5·25	5·49	1·56	6·8	4·46	6·31
6	5·58	5·36	5·24	5·49	4·55	6·8	4·46	6 31
7	5·57	5·36	5 23	5·50	4·54	6·9	4·46	6 32
8	5·56	5 37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·55	5·37	5·21	5·51	4·53	6·11	4·46	6·33
10	5·54	5·38	5·20	5·52	4·53	6·11	4·47	6·34
11	5·53	5·38	5·19	5·52	4·52	6·12	4·47	6·35
12	5·52	5·38	5·18	5·53	4·51	6·13	4·47	6·35
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·51	6·14	4·47	6·37
15	5·48	5·40	5·14	5·54	4·50	6·15	1·48	6·37
16	5·47	5·40	5·13	5·55	4·50	6·16	4·48	6·38
17	5·46	5·41	5·12	5·55	4·49	6·17	4·48	6·39
18	5·45	5·41	5·11	5·56	4·49	6·18	4·49	6·39
19	5·44	5·42	5·10	5·57	4·48	6·18	4·49	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·50	6·40
21	5·41	5·42	5·8	5·58	4·48	6·20	4·50	5·41
22	5·40	5·43	5·7	5 58	4·47	6·21	4·51	6·41
23	5·39	5 43	5·6	5·59	4·47	6·22	4·51	6·42
24	5·38	5·44	5·6	6·0	4·47	6·22	4·52	6·42
25	5·36	5·44	5·5	6 0	4·47	6·23	4·52	6·43
26	5·35	5·45	5·4	6 1	4·16	6·24	4 53	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·25	4·54	6·44
29	5·32	5·46	5·1	6 3	4·46	6·26	4·54	6·44
30	5·31	5·47	5·0	6·4	4·46	6·27	4·55	6·15
31	...	...	5·0	6·4	...	...	4·56	6·45

PHASES OF THE MOON.

		H. M.
1 Sept.	☾ First Quarter	2 21 a.m
9 ,,	○ Full Moon	1 57 ,,
16 ,,	☽ Last Quarter	3 51 ,,
22 ,,	● New Moon	0 37 ,,
30 ,,	☾ First Quarter	9 8 p.m.
8 Oct.	○ Full Moon	2 11 p.m.
15 ,,	☽ Last Quarter	9 46 a.m.
22 ,,	● New Moon	2 9 p.m
30 ,,	☾ First Quarter	4 41 ,,
7 Nov.	○ Full Moon	1 48 a.m.
13 ,,	☽ Last Quarter	5 19 p.m.
21 ,,	● New Moon	6 49 a.m
29 ,,	☾ First Quarter	11 42 ,,
6 Dec.	○ Full Moon	0 52 p.m.
13 ,,	☽ Last Quarter	3 46 a.m.
21 ,,	● New Moon	1 40 ,,
29 ,,	☾ First Quarter	4 47 ,,

Plate XXIII.

Chinese Jasmine (*Trachelospermum jasminoides*, syn. *Rhynchospermum jasminoides*).

Plate XXIV.

"Purple Wreath" (*Petraea volubilis*).

Animal Pathology.

A BRIEF ACCOUNT OF THE "WORM-NODULES" OCCURRING IN CATTLE.

BY T. HARVEY JOHNSTON, M.A., D.Sc., &c., Bio'ogy Department, University, Brisbane

Worm-nodules or worm-nests in Australian cattle are the result of an irritation set up by the presence of long delicate round worms or nematodes, known scientifically as *Onchocerca gibsoni,* Cleland and Johnston. These nodules are now known to be common and widespread in this State, which is an important meat-producing country. Owing to the beef being infested with these parasites, a very rigorous system of meat inspection is now enforced at British ports, and the infected portions are removed and either destroyed or returned. This involves a certain amount of delay as well as a considerable financial loss. Moreover, the altered shape of the quarters from which the parts containing the nodules have been removed has been found to unfavourably affect the sale of such meat. The latter matter will adjust itself when people become used to the alteration, but the monetary loss must still fall on pastoralists and all interested in the meat export industry.

The nodules may be approximately spherical, varying in size from about three-quarters of an inch to nearly 2 in. in diameter, or they may be elongate, the long axis reaching 3 or even 4 in. Sometimes, though rarely, worm-nests measuring only a quarter of an inch across have been met with. On cutting across a nodule, one notices that the "worm-area" lies at or near the centre, though occasionally quite eccentrically. There is very little variation in the size of this "area," though the thickness of the surrounding fibrous capsule may vary greatly in different nodules. The parasite lies coiled in the worm-area in such an intricate manner that it is impossible to extract the female entire. The small, thin, male worms may occasionally be obtained in an unbroken state. These nematodes lie in a definite tunnel or canal, within which they appear to be capable of slight movement. Sometimes the two sexes lie side by side in a tunnel in such a position that fertilisation may be effected. The actual nodules are the result of an irritation of the tissues of the host, set up by the presence of the parasite, probably aided by some irritating secretion produced by the latter. When the worm dies, it begins to degenerate, ultimately becoming calcified and broken down, the worm-area undergoing a similar alteration. This condition is more frequently met with in older animals. The statements that tuberculosis is commonly associated with this degeneration, are not substantiated.

The usual situations in which the parasites occur are the brisket and flank, between whose muscles and in whose subcutaneous tissues the worm-nests lie. The brisket is by far the commonest site occupied. Sometimes the "nests" lie so deeply buried that their presence is likely to be overlooked. They are present occasionally in other parts of the body. As many as fifty nodules have been taken from one animal, and in one instance twenty-one were counted in the brisket alone.

Neither the age nor sex of cattle, nor the climatic conditions, seem to have any effect on the degree of infection. Calves, cows, and bullocks are more or less similarly affected, while cattle from coastal districts are

as much infested as those from the inland areas. Of course all districts are not equally infected, as there are some parts where the percentage of parasitised cattle is very high, while in other regions it is relatively low, and in others the condition is probably absent. The amount of infection, as a general rule, decreases southwardly. Though this parasitic condition is common in the Northern Territory and Queensland, it is less frequently met with in Western Australia and New South Wales. Its presence in Victoria is doubtful, while it is unknown in local cattle in Tasmania. Of course nodules are not infrequently met with at Southern abattoirs in cattle which have come "overland" from this State.

Professor Gilruth states that "so far as could be ascertained no cattle station in Queensland is entirely free from the parasite," that at least 20 per cent. of animals on "clean" stations are affected, and that a complete examination would possibly show that 50 per cent. is a nearer approximation. He refers to an instance in which 10 per cent. were found to be infected after careful examination by manipulation, but on examining by partial dissection "another 25 per cent. were found to harbour the nodules." Thus 35 per cent. of the cattle from a "notoriously clean station" from South-western Queensland were found to possess worm-nests. In two mobs from North-western Queensland he detected their presence in 60 per cent., while on examination by dissection every animal was found to contain some nodules. Dr. Hancock, in a report on the method of meat inspection at the port of London, stated that "since examination has been systematically made, at least 50 per cent. of all consignments from Queensland ports have been found to contain a variable percentage of affected carcasses." Judging from Dr. Gilruth's remarks the latter estimate would be greatly increased if a more searching examination than time allows the inspectors to make were carried out. The editor of the "British Medical Journal" (3rd December, 1910) mentioned that about 75 per cent. of the carcasses were found to be parasitised. Dr. Macfadden, in a report (1911) to the Local Government Board, dealing with "orchocerciasis" in Australian beef, stated that at first 10 per cent. of the quarters in each consignment were examined for the presence of nodules, but on a more complete examination it was noticed that a much larger percentage was infected, and in some instances "*as many as 100 per cent. of those already passed" were found to contain worm-nests.* If we consider what a large amount of meat is exported from Eastern Australia, especially Queensland and New South Wales, to Great Britain and elsewhere, we must realise the seriousness of this parasitic invasion. Dr. Macfadden, in his report, refers to the fact that between 60,000 and 70,000 quarters of Australian beef arrived per month at the port of London alone, between July and October of last year.

In regard to the effect on the animal and the quality of its meat, the presence of the parasite is negligible. The health of the animal does not in any way suffer. Nor is the meat deteriorated in quality, though the removal of the affected parts has a prejudicial effect on the appearance of the carcase. We think that the nodules should be removed, but even if eaten, as has often occurred, no ill-effects are likely to occur. There is no danger of transmission to human beings.

A few remarks on the parasite itself may not be out of place. Its name is *Onchocerca gibsoni,* but it was previously confused with an allied worm, *O. reticulata,* more commonly, though less correctly, known as *Spiroptera reticulata,* which infests horses in Southern Europe. The female is very long, but its exact length is unknown, owing to the

impossibility of extracting it entire. By adding together the lengths of all the fragments collected from a single nodule which apparently contained only one worm, a total length of over 3 ft. was obtained. In one case the length was found to reach nearly 5 ft. The body is ornamented with prominent spirally-arranged ridges, which are much less conspicuous in the case of the male. The latter is a relatively small, thin worm of about 2 in. long. It is thus only about one-twentieth of the length of the female.

From the economic point of view, the most important feature is the means of transmission. This is at present quite unknown, and, moreover, the life history is not yet known in the case of the allied nodule-producing species from human beings (*O. volvulus*), camel (*O. fasciata*), horses (*O. reticulata* and *O. cervicalis*), buffaloes and cattle (*O. armillata* and *O. gutturosa*). Until we know how the infection is carried from one animal to another, it is impossible to formulate measures for the eradication of the pest. In all probability the transmitting agent is a biting or blood-sucking insect, or perhaps a tick, but this remains to be proved by experimental investigations. The embryos of the parasite are produced in enormous numbers, but so far they have not been found in the blood. Before a blood-sucking fly or mosquito or louse can take up the embryos the latter must reach the blood stream. Up to the present only negative results have attended experimental work.

There seems to be little doubt but that *Onchocerca gibsoni* was originally a parasite of cattle and perhaps of buffaloes, in South-eastern Asia and the East Indies. Nodules are known to occur in the briskets of cattle from these regions, and there is proof that animals from the East Indies were imported long ago into the Northern Territory. Some must have been infected, and from this district, infection has spread southward. There is another parasite, *O. gutturosa,* causing the formation of nodules in the neck ligament of cattle in Northern Algeria and Tunis, while in India and the East Indies, another worm, *O. armillata,* infests the walls of the aorta of bovines, producing a nodular formation at the affected part. The allied human parasite, *O. volvulus*, found in equatorial Africa, is not so restricted in its choice of a situation, though its favourite seat appears to be in the region of the lowest ribs. The horse harbours two species of *Onchocerca*, the one, *O. reticulata,* preferring the legs and the other, *O. cervicalis,* the neck.

The above remarks are more or less of the nature of a series of extracts from a paper " On the Occurrence of Worm-nodules in Cattle," which is being published in the Journal of the Royal Society of Queensland.

General Notes.

VETERINARY NOTES.

Stockowners in Queensland will read with interest the following list, which enumerates the infective diseases existing amongst animals in some other parts of the world. This list was in possession of the Board of Agriculture and Fisheries, England, on 1st August, 1911:—

Austria (week ending 12th July).—Anthrax, blackleg, swine fever, foot and mouth disease (7,952 Höfe), glanders, and farcy.

Belgium (fifteen days ending 15th June).—Anthrax, blackleg, rabies, foot and mouth disease (1,464 " foyers" in 289 " communes").

Bulgaria (week ending 14th July).—Anthrax, glanders and farcy, rabies. sheep scab, swine fever, swine erysipelas, foot and mouth disease.

Denmark (month of June).—Anthrax, swine erysipelas.

France (month of June).—Anthrax, blackleg, glanders and farcy, rabies, sheep pox, sheep scab, swine erysipelas, swine fever, foot and mouth disease (3,958 " etables" in 944 " communes").

Germany (on 30th June).—Glanders and farcy, swine fever, foot and mouth disease (20,793 infected places in 373 parishes).

Holland (month of June).—Anthrax, footrot, swine erysipelas, foot and mouth disease (18,241 outbreaks in ten provinces).

Hungary (on 5th July).—Anthrax, rabies, swine erysipelas, swine fever, foot and mouth disease (7,480 " cours").

Italy (week ending 12 June).—Anthrax, glanders and farcy, rabies, swine erysipelas, swine fever, foot and mouth disease (1,549 cases entailing 29,540 animals).

Montenegro (sixteen days ending 15th April).—Foot and mouth disease (fifty-four " etables" infected in eleven " communes").

Norway (month of June).—Anthrax, blackleg.

Roumania (nine days ending 13th July).—Anthrax, dourine, glanders and farcy, pleuro-pneumonia, rabies, sheep pox, sheep scab, swine erysipelas, swine fever.

Russia (month of March).—Anthrax, cattle plague, glanders and farcy, pleuro-pneumonia, rabies, sheep pox, swine erysipelas, swine fever, foot and mouth disease (77,126 cases in 1,350 " communes").

Servia (eight days ending 15th July).—Anthrax, rabies, sheep pox, swine fever, foot and mouth disease (139 cases in four " arrondissements").

Spain (month of April).—Anthrax, blackleg, dourine, rabies, sheep pox, sheep scab, swine erysipelas.

Sweden (month of June).—Anthrax, blackleg, swine fever.

Switzerland (week ending 23rd July).—Anthrax, blackleg, swine erysipelas, foot and mouth disease (232 " etables" and 180 " alpages-paturages" entailing 17,879 animals, of which sixty-three " etables" and thirty-six " alpages-paturages" were declared during the week).

It will be obvious to all stockowners how comparatively free our Queensland stock are from contagious diseases.

Continental Countries.	Queensland.
Anthrax	Does not exist.
Swine fever	„
Swine erysipelas	„
Foot and mouth disease ..	„
Glanders and farcy	„
Rabies	„
Sheep scab	„
Sheep pox	„
Foot rot	„
Dourine	„
Cattle plague	„
Pleuro-pneumonia	Exists.
Blackleg	„

And we must include tick fever. Although not contagious or infectious in the true sense, it has for some years past caused more losses to stockowners than any other disease.

Queensland is entitled to some credit for this comparative freedom from diseases referred to. It has its own stock laws, which deal with stock suffering from contagious or infectious diseases, and also made the necessary quarantine regulations for controlling the importation of animals from oversea countries until the Federal Government undertook this work for all Australia. Importers of stock frequently complain that quarantine restrictions are harsh and unnecessary, but when the situation is carefully reviewed, with a knowledge of stock diseases, quarantine regulations are found essential and imperative for the safeguarding of our Queensland stock. It has been found necessary to destroy diseased animals in quarantine, but had there been no quarantine the disease would probably have been spread considerably before the seriousness of the trouble was realised by the owner. At the present time the period of isolation for the various animals when in quarantine is as follows, the time dating from when they are removed from the ship:—

	Days.
Horses, asses, and mules from the United Kingdom ..	14
Horses, asses, and mules from the United States of America	28
Asses from France, Spain, and Portugal	28
Cattle from the United Kingdom	40
Cattle from Canada	60
Swine from the United Kingdom and Canada ..	14
Swine from New Zealand	28
Sheep and goats from the United Kingdom and Canada	30
Dogs from the United Kingdom	60

FRUIT AT HERBERTON.

Mr. Charles Ross, Instructor in Fruit Culture, in the report of his Northern tour last winter, mentioned that he had pruned some raspberries grown by Mr. Chas. Harding, of Glen Hardurg, Herberton, which both pleased and surprised him. They had produced strong healthy canes, but Mr. Ross was dubious about their fruiting qualities in that latitude, and awaited with much interest a report as to how they bore. He has now received a most interesting letter from Mr. Harding, in which the latter states:—" A few lines regarding fruit prospects at Nigger Creek may interest you. The raspberry canes are a total failure; apples give every prospect of a fine crop; pears the same; grapes, splendid crop of Isabels, and the better class of table fruits are equal to the Isabels. Persimmons promise a splendid crop. Plums, very few fruit set."

The unusually dry winter and spring is probably the cause of the plums not setting freely.

Answers to Correspondents.

SUITABLE GRASS AND SPRAYING MACHINE.

H. P.—

Suggest Rhodes grass, seed of which can be obtained around Nanango. A good winter grass. A Figaro knapsack spray pump (Perry Bros., Queen street, Brisbane) is a suitable implement for small areas.

PREVENTION OF SUCKERS AFTER BURNING OFF.

LANCASHIRE COVE, BURRAMBA, VIA WARWICK.

Write to Aplin, Brown, and Crawshay for their tree poison. Chip the bark (if any left) close to the ground, but do not remove it. If no bark then chip the wood. Pour in the diluted poison as per directions, from an oil can or teapot. The roots will be destroyed and consequently no suckers will come up.

DIPPING FLUID.

J.W.—

Assuming cattle dip is desired, the Queensland Cattle Dip Company and Mr. H. R. Davies, 731 Ann street, Valley, Brisbane, sell a preparation mixed according to the departmental formula.

STATE FARMS.

H. F., Gladstone.—

Will reply directly to your questions.

BLEEDING OF HORSES.

G. G. H.—

If heavy horse, two quarts will be sufficient; according to lightness of horse, correspondingly less.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR NOVEMBER.

Article.		November. Prices.
Bacon, Pineapple	lb.	7½d. to 9d.
Bran	ton	£6 15s.
Butter, Factory	lb.	1s.
Chaff, Mixed	ton	£3 10s. to £5 10s.
Chaff, Oaten (Victorian)	"	£5 15s.
Chaff, Lucerne	"	£4 to £6
Chaff, Wheaten	"	£2 10s. to £3
Cheese	lb.	7½d.
Flour	ton	£9 15s.
Hay, Oaten (Victorian)	"	£6 10s.
Hay, Lucerne	"	£3 to £5 10s.
Honey	lb.	2d. to 2½d.
Maize	bush.	4s. 2½d.
Oats	bush.	3s. 2d. to 4s.
Pollard	ton	£6 15s.
Potatoes	"	£7 to £10
Potatoes, Sweet	"	£7 10s.
Pumpkins	ton	£6 10s.
Wheat, Milling	bush.	4s. 6d.
Onions	ton	£5 10s. to £6
Hams	lb.	1s. 1½d.
Eggs	doz.	7d. to 8¾d.
Fowls	pair	3s. 3d. to 4s. 3d.
Geese	"	7s. 6d. to 8s. 6d.
Ducks, English	"	3s. 6d. to 6s.
Ducks, Muscovy	"	4s. 6d. to 6s. 6d.
Turkeys (Hens)	"	6s. to 7s.
Turkeys (Gobblers)	"	12s. 6d. to 17s.

SOUTHERN FRUIT MARKET.

Apples (Choice), per case	7s. to 8s.
Apples (Cooking), per case	...
Bananas (Queensland), per bunch	3s. to 9s.
Bananas (Queensland), per case	7s. 6d. to 9s.
Bananas (Fiji), G.M., per bunch	8s. to 12s.
Bananas (Fiji), G.M., per case	18s. to 18s. 6d.
Cocoanuts, per dozen	2s. 6d. to 3s.
Custard Apples, per tray	...
Grapes, per half-case	...
Lemons per gin case	1s. 6d. to 2s.
Lemons (local), per gin case	...
Mandarins (local Emperors), per case	11s. to 12s.
Mandarins (Queensland), per case	...
Oranges (Queensland), per case	7s. 6d.
Oranges (Navels), per case	16s. to 18s.
Oranges (Sevilles), per case	2s. 6d. to 3s.
Passion Fruit, per half-case	5s. to 11s.
Papaw Apples, per half-case	2s. to 4s.
Peanuts, per lb.	3d. to 4d.
Pears, per gin case	...
Pineapples (Queensland), common, per case	5s. to 6s.
Pineapples (Queensland), Ripley's, per case	7s. to 8s.
Pineapples (Queensland), Queen's, per case	7s. to 8s.
Strawberries, (Queensland), per 3-quart tray	...
Tomatoes (Queensland), per bushel case	5s. to 5s. 6d.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	NOVEMBER. Prices.
Apples (Eating), per case	8s. to 10s.
Apples (Cooking), per case	7s. 6d. to 9s.
Bananas (Cavendish), per dozen	4d. to 4½d.
Bananas (Sugar), per dozen	3d. to 3½d.
Cape Gooseberries, per case	4s. to 8s.
Cherries, per quarter-case	3s. to 7s. 6d.
Custard Apples, per quarter-case	...
Citrons, per cwt.	...
Lemons, per case	4s. to 7s.
Loquats, per half gin-case	8s. to 11s.
Mandarins, per case	8s. to 10s.
Mangoes, per case	8s. to 9s.
Nectarines, per case	...
Oranges per case	9s. to 10s.
Papaw Apples, per quarter-case	1s. to 1s. 9d.
Passion Fruit, per quarter-case	5s. to 7s.
Peaches, per case	1s. to 3s. 6d.
Pears, per case	...
Peanuts, per lb.	3½d.
Persimmons, per quarter-case	...
Plums, per case	...
Pineapples (Ripley), per dozen	2s. to 3s. 6d.
Pineapples (Rough), per dozen	1s. to 3s.
Pineapples (Smooth), per dozen	2s. 6d. to 4s. 6d.
Strawberries, per tray	...
Strawberries, per doz. boxes	2s. to 4s.
Tomatoes, per quarter-case	2s. to 3s. 6d.

TOP PRICES, ENOGGERA YARDS, OCTOBER, 1911.

Animal.	OCTOBER. Prices.
Bullocks	£10 to £11 7s. 6d.
Bullocks (single)	...
Cows	£7 to £8 17s. 6d.
Merino Wethers	23s.
Merino Ewes	18s. 3d.
Crossbred Wethers	20s. 9d.
Crossbred Ewes	20s. 6d.
Lambs	17s. 6d.
Pigs (Porkers)	32s.

Farm and Garden Notes for January.

Field.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish Blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole.

Kitchen Garden.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflowers, mustard, cabbage, celery, radish, for Autumn and Winter use. Sow celery in shallow, well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

Flower Garden.—To make the flower beds gay and attractive during the Autumn and Winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost, then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle lift them gently one by one with a knife or a zinc label—*never pull them up by hand,* as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Then keep a sharp lookout for slugs and caterpillars. Keep a supply of tobacco dust on hand, and scatter this in the path of the slug, and he will cease from troubling you.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to overwater at this season. Propagate verbenas, not forgetting to include the large scarlet Fox-hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work. The flower garden in Autumn and Winter will present a charming sight, and will afford light and profitable work for girls with spare time on their hands.

An exhaustive booklet on "Flower Gardening for Amateurs" has been issued by the Department of Agriculture and Stock, and may be obtained from the Office. Price, 2s.

Orchard Notes for January.

THE SOUTHERN COAST DISTRICTS.

The fruit of the month in this part of the State is the grape, and its gathering and marketing will occupy the attention of growers. Care should be taken to cut the fruit when cool and dry, and if it has to be sent any distance the stems of the bunches should be allowed to wilt before the fruit is packed, as the berries will then hang on to the bunch better, and the bunch carry in better order. Select the fruit carefully, grade it, and pack firmly so that it will not bruise in transit. If to be sent long distances, pack in crates holding from four to six 6-lb. baskets. Pines will be ripening in quantity towards the end of the month. Gather before fully coloured, and, whether for Southern or local markets, pack and handle carefully to prevent bruising. Do not ship the fruit too green for the Southern markets, as doing so is apt to spoil the trade. Send good fruit to the canneries. Small pines and crippled fruit are no good to canners, and the sooner our growers realise that it only pays to grow good fruit the better for them and for the canners, as if the latter cannot get good fruit it is impossible for them to put a line of goods that will not only be a credit to the State, but for which a world-wide market can be obtained.

Passion fruit should not be allowed to lie about for days on the ground before gathering, as if so they are apt to become fly-infested.

Watermelons and rock melons are still in season.

Watch any late peaches, Japanese plums, or other fruits liable to be infested with fruit fly, and gather and destroy all infested fruit, or, better still, grub the trees out and burn them, as they only breed flies to destroy more valuable fruit. Mangoes will be ripening during the month. See that all fly-infested fruits are destroyed, as they will only breed up further crops to destroy later ripening fruits.

Citrus orchards can be cyanided during the month for scale insects, and spraying for Maori with the sulphide of soda wash should be continued where necessary.

Mangoes can be budded during the month, as well as citrus and deciduous trees. Tropical fruit trees can be transplanted, taking care to choose dull weather and to cover same from the direct rays of the sun till they have become firmly established. Pines and bananas can still be planted.

TROPICAL COAST DISTRICTS.

See that all bananas are covered with netting, as the fly is usually at its worst at this time of year.

Mangoes will be going off. See that they are not allowed to remain about on the ground to breed flies for the Autumn crop of oranges. Longan, litchi, and other fruit are in season. As the month is often a very wet one, little cultivation can be done in the orchards. Strong undergrowth should, however, be kept down with a hoe or scythe. Tropical fruits of all sorts can be planted. Look out for Maori on citrus fruits, and spray when necessary.

SOUTHERN AND CENTRAL TABLELAND.

January is a busy month in the Stanthorpe district, apples, pears, plums, peaches, and nectarines being in season. Do not gather the fruit too immature; at the same time, don't allow it to be over-ripe. Gather dry, handle carefully, grade and pack in attractive cases. Keep the fruit as cool as possible, and ship in well-ventilated cars. Keep a sharp lookout for fruit fly, and take every possible means to prevent its spreading, even going as far as to gather and destroy the whole of the fruit on any infected trees. as if kept in check during the month the bulk of the fruit ripening during February will be free.

Keep a sharp lookout also for codling moth, examine the bandages on the trees at least every ten days, and destroy all larvæ found therein; also gather and destroy all moth-infected fruit.

Gather Bartlett pears as soon as they are large enough, and store away in a cool shed to ripen; when they show signs of ripening, market, not before. If sent down green they will sell for cooking, and only fetch a small price. The right stage at which to gather is when the fruit is fully developed, and the flesh has lost its woody flavour, but is still quite hard. This is usually before the fly has stung it, and if gathered at this stage the fruit will ripen up properly without shrivelling, and develop its full flavour.

These remarks apply also to the Downs country, which is somewhat earlier than Stanthorpe.

The crop of the month in the Western tablelands is the grape; and the remarks I have made respecting this fruit when grown in the Southern Coast districts apply equally here. The fruit should be gathered dry, and wilted before it is packed. Too large cases are often used; cases holding from 20 to 30 lb., or crates holding six 6-lb. baskets, are preferable, the latter being the best package for shipping the fruit long distances. Keep the orchards well cultivated, and, where water for irrigation is available, give citrus trees a watering during the month, unless there has been a sufficient rainfall. When the orchard is irrigated, see that thorough cultivation follows the irrigation, so as to conserve the moisture in the soil.

Red Scale, which is prevalent on citrus trees in the dry Western country, should be treated during the month. Cyaniding is the best remedy.

TESTING OF FARM SEEDS.

By J. C. BRÜNNICH and E. H. GURNEY.

Good soils in thorough tilth, rich fertilisers, and favourable seasons are not sufficient to ensure successful crops, unless they are supplemented by the use of good reliable seeds. Nothing can be more disappointing to a farmer than bad seed, as using such not only leads to a more or less complete loss of the crop, and waste of time and labour, but may also be the cause of the introduction of many weeds and diseases.

The official testing of farm seeds, which is an important part of the duties of the agricultural laboratories elsewhere, has hitherto been almost completely neglected in Australia, and for this reason it has been deemed advisable to make a start, if even on a small scale, here in Queensland with such tests. Our metropolitan seed merchants were approached, and they all readily responded, so that we were able to collect ninety-five samples of seeds from eleven dealers.

On the whole the results, which are given herewith in tabulated form, are very satisfactory, particularly when we consider that all the seeds were obtained at the tail-end of the season, and we may, therefore, safely state that non-success of any crop cannot be attributed to bad qualities of the seeds.

The seeds are particularly pure, with the exception of the smaller seeds, more difficult to harvest, which contain the usual impurities, well within the limits generally allowed. The amount of impurities is given in percentage of weight, and the varieties of weed seeds were also separated and counted.

The germinating power of the seeds, both as regard to the actual speed and the energy of germination, was found to be good.

The results of the tests of some of the grass seed appear rather disappointing, but some grass seeds are very difficult to germinate, and it is a well known fact that paspalum seed, for instance, may almost completely fail to germinate the first season after being sown, but the seeds remaining in the ground germinated splendidly the second year. It is quite possible that special precaution and certain treatment of the seeds are required when testing, which we, in the short time at our disposal for this preliminary test, have not yet found out. Practical men consider a

germination of 20 to 25 per cent. of many grass seeds as quite satisfactory, and this amount is really not bad when we bear in mind the enormous number of seeds contained in one ounce.

Lab. No.	Variety of Seed.	Germination—Per cent.	No. of Seeds in 1 oz.	Weight of 1,000 Seeds in Grams.	Impurities,	
					Actual Per cent. by Weight.	Kind of Impurities.
769	Lucerne, Arabian	83	12,878	2·20	Nil	
713	Ditto	63	13,186	2·15	0·55	6 varieties of weed seeds and 14 stalks
733	Ditto	86	14,766	1·92	0·69	7 varieties of weed seeds
736	Ditto	79	13,411	2·11	0·40	3 ditto ditto
758	Ditto	79	13,156	2·15	0·43	2 ditto ditto
763	Ditto	77	16,445	1·72	Nil	
788	Ditto	75	13,799	2·05	1·25	6 ditto ditto
732	Clover, White Dutch ...	62	40,090	0·70	2·39	15 ditto ditto
699	Ditto, White	65	42,280	0·67	2·01	12 ditto ditto
721	Cowpea	98	167	170·00	0·90	Grit, &c.
707	Ditto	97	183	155·00	0·39	Ditto
773	Pea, Yorkshire Hero ...	100	92	309·00	Nil	
755	Ditto, ditto ..	96	87	327·30	Nil	
739	Ditto, ditto ...	94	86	330·60	1·42	Grit
720	Ditto, ditto ...	99	78	362·50	Nil	
761	Ditto, Gradus	89	90	315·70	Nil	
702	Ditto, Pilot	76	94	302·50	Nil	
746	Ditto, Stratagem	98	72	391·00	Nil	
701	Ditto, Telephone	49	89	317·50	Nil	
754	Bean, Canadian Wonder ...	95	45	626·90	Nil	
762	Ditto, ditto ...	90	47	605·90	Nil	
745	Ditto, ditto ...	85	47	597·40	Nil	
718	Ditto, ditto ...	88	52	547·50	Nil	
706	Ditto, Green Pod, Stringless	90	67	425·00	Nil	
703	Soy Bean	68	172	165·00	Nil	
775	Pumpkin	80	127	224·00	Nil	
700	Ditto	95	95	297·50	Nil	
747	Ditto	98	83	343·00	Nil	
722	Ditto	93	114	247·50	Nil	
717	Marrow	90	199	142·50	Nil	
778	Ditto	97	201	141·00	Nil	
705	Ditto	91	199	142·50	Nil	
723	Squash, Custard White ...	92	199	142·50	Nil	
708	Ditto	95	344	82·50	Nil	
724	Cucumber	85	1,029	27·54	Nil	
748	Ditto	94	1,031	27·51	Nil	
710	Ditto, Long Green Prickly	89	1,082	26·20	Nil	
779	Tomato, Ponderosa ...	75	10,852	2·61	Nil	
771	Ditto, Matchless	88	8,921	3·17	Nil	
704	Ditto, Trucker's Favourite	98	8,932	3·17	Nil	
729	Ditto ditto	87	7,518	3·77	Nil	
760	Ditto ditto	95	10,213	2·77	Nil	
780	Silver Beet	55	1,403	20·20	Nil	
738	Sorghum	68	1,778	15·94	Nil	
731	Ditto	28	1,365	20·76	Nil	
744	Ditto	74	1,807	15·69	Nil	
716	Ditto	95	1,865	15·20	Nil	
766	Ditto	79	1,564	18·12	Nil	
786	Ditto	70	1,560	18·17	Nil	
776	Imphie	87	1,553	18·25	Nil	
765	Ditto	80	1,746	16·24	Nil	
787	Ditto	97	1,693	16·75	Nil	
757	Ditto	21	1,776	15·96	Nil	
792	Ditto	79	1,627	17·42	Nil	
749	Ditto	80	1,504	80·84	Nil	
740	Ditto	73	1,674	16·93	Nil	
715	Ditto	43	1,623	17·46	Nil	
737	Ditto	88	1,482	19·13	Nil	
730	Ditto	37	1,625	17·44	Nil	
711	Panicum, White Japanese...	97	13,810	2·05	1·65	2 varieties weed seed and grit

Lab. No.	Variety of Seed.	Germination—Per cent.	No. of Seeds in 1 oz.	Weight of 1,000 Seeds in Grams.	IMPURITIES. Actual Per cent. by Weight.	Kind of Impurities.
714	Panicum, White Japanese...	93	7,873	3·60	Nil	
794	Ditto	95	9,078	3·12	Nil	
789	Ditto	90	9,137	3·10	Nil	
784	Ditto	87	12,863	2·20	1·3	3 varieties weed seed and stalks, &c.
777	Ditto	83	12,679	2·23	0·32	Stalks.
725	Ditto	86	8,389	3·38	Nil	
770	Ditto	68	12,593	2·25	Nil	
759	Ditto	85	12,833	2·20	Nil	
734	Ditto	91	13,071	2·17	1·99	3 varieties weed seeds, husks, &c.
793	Ditto Giant	53	10,061	2·81	Nil	
728	Ditto ditto	99	11,553	2·45	Nil	
750	Ditto ditto	91	12,199	2·32	1·31	2 varieties weed seeds
742	Ditto ditto	86	14,025	2 02	Nil	
783	Millet	80	8,827	3·21	Nil	
735	Ditto	80	8,764	3·23	Nil	
768	Ditto Siberian	51	15,227	1·86	1·20	
767	Ditto Japanese	96	8,493	3·33	Nil	
719	Maize ditto	97	58	487·5	Nil	

GRASSES.

Lab. No.	Variety of Seed.	Germination—Per cent.	No. of Seeds in 1 oz.	Weight of 1,000 Seeds in Grams.	Actual Per cent. by Weight.	Kind of Impurities.
790	Prairie Grass	52	3,022	9·38	..	
791	Rhodes ditto	36	126,560	0·22	0·47	Stalks, &c.
774	Ditto ditto	35	125,440	0·22	Nil	
772	Ditto ditto	28	90,290	0·31	3·00	1 variety weed seed
753	Ditto ditto	32	96,930	0·29	Nil	
743	Ditto ditto	23	105,790	0·26	Nil	
752	Ditto ditto	31	109,050	0·26	Nil	
727	Ditto ditto	27	77,380	0·36	Nil	
709	Ditto ditto	18	102,880	0·27	Nil	
764	Paspalum	47	18,432	1·53	Nil	
756	Ditto	12	31,965	0·88	Nil	
712	Ditto	9	30,225	0·93	3·88	3 varieties wheat seeds, grit, &c.
782	Ditto	4	23,764	1·19	Nil	
751	Ditto	35	22,882	1·23	Nil	
726	Ditto	26	17,935	1·58	Nil	
741	Ditto	7	25,842	0·79	Nil	
785	Ditto	63	15,629	1·81	Nil	